PB-229 746

CONFERENCE ON POLLUTION OF THE INTERSTATE WATERS OF THE RARITAN BAY AND ADJACENT WATERS, SESSION (1ST) HELD AT NEW YORK, N. Y. ON 22 AUGUST 1961

Public Health Service
Washington, D.C.

22 August 1961

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TRANSCRIPT OF CONFERENCE

Conference on Pollution of the Interstate Waters
of the
Raritan Bay and Adjacent Waters, First Session

Called by the Surgeon General, Public Health Service,
Under the Federal Water Pollution Control Act

The Public Health Service, U. S. Dept. of Health, Education, and Welfare,
the Interstate Sanitation Commission and the
State Water Pollution Control Agencies of
New Jersey and New York

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Springfield VA 22151

New York, New York

August 22, 1961

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Conference on Pollution of the Interstate Waters of the Raritan Bay and Adjacent Waters

First Session

August 22, 1961

U. S. Courthouse
Foley Square
New York, New York

Chairman:	Mr. Murray Stein Chief, Enforcement Branch U. S. Public Health Service Washington, D. C.
Conferees:	Mr. Lester M. Klashman Regional Program Director Region II Division of Water Supply and Pollution Control U. S. Public Health Service New York, N. Y.
	Mr. Thomas R. Glenn, Jr. Director and Chief Engineer Interstate Sanitation Commission New York, N. Y.
	Dr. Roscoe P. Kandle Commissioner, New Jersey State Department of Health Trenton, New Jersey
	Dr. Hollis S. Ingraham First Deputy Commissioner State Department of Health Albany, New York

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Bacteriologist
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Dr. Donald A. Henderson
Chief, Surveillance Section
Epidemiology Branch, Communicable Disease Center
Atlanta, Georgia

Dr. Alexander D. Langmuir
Chief, Epidemiology Branch
Communicable Disease Center
Atlanta, Georgia

Mr. Sylvan C. Martin
Regional Engineer
Region II
Sanitary Engineering
New York, N. Y.

Mr. Paul De Falco, Jr.
Chief, Water Resources Development Section
Region II
Division of Water Supply & Pollution Control
New York, N. Y.

Department of the Army

Mr. R. H. Wuesterfeld
Chief, Permits Branch
Corps of Engineers
New York District Engineer
New York, N. Y.

Mr. William Wechter
Sanitary Engineer
Headquarters, First Army
New York, N. Y.

Treasury Department

Commander George Hardy
Third District, U. S. Coast Guard
New York, N. Y.

OTHER APPEARANCES (Continued)

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Mr. James B. Engle
Director, Biological Laboratory
Fish and Wildlife Service
Bureau of Commercial Fisheries
Annapolis, Maryland

Interstate Sanitation Commission

Dr. William C. Cope
Chairman
New York, N. Y.

Dr. Natale Colosi
Vice Chairman
New York, N. Y.

Dr. Mitchell Wendell
Counsel
New York, N. Y.

State of New Jersey

Mr. E. Powers Mincher
Counsel
New Jersey State Department of Health
Trenton, New Jersey

Mr. H. Mat Adams
Acting Commissioner
N. J. Dept. of Conservation and Economic Development
Trenton, New Jersey

Mr. Ariel A. Thomas
Metcalf & Eddy
Consulting Engineers
for Middlesex County Sewerage Authority
Sayreville, New Jersey

State of New York

Mr. Harold F. Udell
Chief, Sanitation Unit
New York State Conservation Department
Freeport, New York

OTHER APPEARANCES (Continued)

State of New York (Continued)

Mr. George Burdick
Senior Aquatic Biologist
New York State Conservation Department
Albany, New York

Prof. William T. Ingram
Engineering Consultant
New York City Department of Health
New York, N. Y.

Dr. Harold T. Fuerst
Director, Bureau of Preventable Diseases
New York City Department of Health
New York, N. Y.

Mr. William A. O'Leary
Director, Division of Sewage Disposal
New York City Department of Public Works
New York, N. Y.

Mr. Stanley Pinel
Chief Engineer
City Administrator's Office
New York, N. Y.

SUMMARY OF CONFERENCE

(FIRST SESSION)

POLLUTION OF INTERSTATE WATERS
of the
RARITAN BAY
AND ADJACENT WATERS
(NEW YORK - NEW JERSEY)

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SUMMARY OF CONFERENCE

(FIRST SESSION)

POLLUTION OF INTERSTATE WATERS

# of the

RARITAN BAY

AND ADJACENT WATERS

(NEW YORK - NEW JERSEY)

The Raritan Bay and adjacent waters which are the subject of the conference include a portion of the Narrows, the Lower Bay, and Sandy Hook Bay, the Raritan Bay, the tidal portions of the Raritan River, the Arthur Kill, and the other smaller tributaries to the named Bays.

The Lower Bay and Raritan Bay, along with Sandy Hook Bay, combine to form a triangular body of tidal water that extends inland for about 10 miles between Staten Island, New York, to the northwest, and the New Jersey shoreline to the south. The boundary between the two States passes approximately from east to west through the middle of the Lower Bay and Raritan Bay to the western end of Raritan Bay where it swings to a northerly direction and continues up the middle of the Arthur Kill. The Arthur Kill is a narrow body of water connecting Raritan Bay, at its southern end, with Newark Bay at its northern end. The Arthur Kill forms the western border of Staten Island and the eastern border of the adjacent sector of New Jersey. The water area in question comprises approximately 30 square miles, which is about equally divided between the two States. These waters form a substantial part of the New York Harbor complex.

On the basis of reports, surveys, and studies, the Surgeon General, having reason to believe that pollution of the interstate waters of Raritan Bay and adjacent waters, caused by discharges of untreated and inadequately treated sewage and industrial wastes by municipalities and industries in New Jersey and New York was endangering the health and welfare of persons in these two States, called a conference on the pollution of these waters. The first session of the Conference was held on August 22, 1961, in Room 1105, U. S. Court House, Foley Square, New York, New York, and commenced at 9:30 a.m. The following conferees representing the water pollution control agencies of the State of New Jersey, the State of New York, the Interstate Sanitation Commission, and the Public Health Service, attended the conference:

Dr. Roscoe P. Kandle	New Jersey State Department of Health
Dr. Hollis S. Ingraham	New York State Department of Health

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Thomas R. Glenn, Jr.	Interstate Sanitation Commission
Lester M. Klashman	Public Health Service, New York, N. Y.
Murray Stein, Chairman	Public Health Service, Washington, D. C.

The following also participated in the Conference:

E. Powers Mincher	New Jersey State Department of Health
H. Mat Adams	New Jersey State Department of Conservation and Economic Development
Ariel A. Thomas	Middlesex County Sewerage Authority
A. F. Dappert	New York State Department of Health
Harold F. Udell	New York State Department of Conservation
William O'Leary	New York City Department of Public Works
William T. Ingram	New York City Department of Health
Stanley Pinel	Administrator's Office New York City
Dr. Harold T. Fuerst	New York City Department of Health
Dr. William C. Cope	Interstate Sanitation Commission
Mitchell Wendell	Interstate Sanitation Commission
Dr. Natale Colosi	Interstate Sanitation Commission
R. H. Wuesterfeld	Corps of Engineers U. S. Army - New York, N. Y.
William Wechter	Headquarters, First Army U. S. Army - New York, N. Y.
Commander George Hardy, USCG	Third District - U. S. Coast Guard New York, N. Y.
James Engle	Fish and Wildlife Service Department of the Interior New York, N. Y.
Dr. Alexander D. Langmuir	Public Health Service Atlanta, Georgia

Dr. Donald A. Henderson	Public Health Service Atlanta, Georgia
Harold S. Clark	Public Health Service Cincinnati, Ohio
Paul De Falco	Public Health Service New York, N. Y.
Sylvan C. Martin	Public Health Service New York, N. Y.
W. W. Brunson	Public Health Service Washington, D. C.

The chairman of the Conference pointed out that:

1. Under the Federal Water Pollution Control Act (Public Law 660 - 84th Congress), as amended, pollution of interstate waters which endangers the health or welfare of persons in a State other than the one in which the discharges originate is subject to abatement under procedures described in section 8 of the Federal Act.

2. The first step of this procedure is the calling of a conference.

3. The purpose of the conference is to bring the States, the Interstate Agency, and the Public Health Service together to lay a basis for future action by all parties concerned and to give the States, the Interstate Agency, and the local governmental agencies an opportunity to take remedial action which may be indicated under State and local law.

Conferees representing the New Jersey State Department of Health, the New York State Department of Health, the Interstate Sanitation Commission, and the Public Health Service, were present throughout the conference.

In the light of the conference statements and discussions, the conferees unanimously agreed to the following conclusions and recommendations:

1. The Raritan Bay and adjacent waters which are the subject of the conference are interstate waters within the meaning of the Federal Water Pollution Control Act.

2. There is pollution of these waters.

3. Scientific data, taking into account a wide range of factors and technological problems, including health, conservation, water policy and uses, and industrial processes are urgently needed, and are the critical issue in further control of pollution of these waters.

4. The Public Health Service, in collaboration with the New Jersey State Department of Health, the New York State Department of Health, and the Interstate Sanitation Commission, will undertake an investigation and study of these waters to accumulate this data.

5. Cognizance is taken of the programs and the administrative machinery of the agencies of the State of New York and the State of New Jersey, and the Interstate Sanitation Commission to control pollution of these waters.

6. There has been, and continues to be, progress under plan, in abatement of the pollution of these waters.

7. The conferees welcome and appreciate the interest, support and collaboration of the Public Health Service in the collective efforts to preserve the Raritan Bay and particularly in solving the scientific problems.

8. The conferees are willing to report to the Public Health Service at appropriate intervals and the Public Health Service will report to the other conferees periodically.

9. The conference will be reconvened on the call of the Chairman one year from the present date in order to evaluate the progress made by the study and investigation and to receive the recommendations of the conferees as to further action.

TRANSCRIPT OF CONFERENCE

Pollution of the Interstate Waters
of the
Raritan Bay and Adjacent Waters, First Session

August 22, 1961

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The conference met, pursuant to notice, at 9:25 A. M., August 22, 1961, in the U. S. Courthouse, Foley Square, New York, Mr. Murray Stein, Chairman, presiding.

MR. STEIN: The conference is open.

This conference in the matter of pollution of the interstate waters of the Raritan Bay and its tributaries, involving the States of New Jersey, New York, the Interstate Sanitation Commission and the Public Health Service, is being held under the provisions of the Federal Water Pollution Control Act. Under the provisions of that Act the Surgeon General of the United States Public Health Service is required to call a conference of this type when, on the basis of reports, surveys, or studies, he has reason to believe that pollution of interstate waters subject to abatement under the Federal Act is occurring. The Surgeon General has called such a conference covering the Raritan Bay and its tributaries.

The purpose of the conference is to bring together the State water pollution control agencies, interstate agencies, the Public Health Service, and the other interested parties, to review the existing situation and progress which has been made, to lay a basis for future action by all parties concerned, and to give the States, localities and industries an opportunity to take any remedial action which may be indicated under State and local law.

The conference mechanism is a time-tested and proved technique. It is used by many States informally in the normal conduct of business in the field of water pollution control. It is indeed prophetic, I think, that as long ago as 1921 the United States Supreme Court, in the famous Interstate Pollution Case of New York against New Jersey, said:

> "We cannot withhold the suggestion inspired by the consideration of this case that the grave problem of sewage disposal presented by the large and growing population living on the shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the States so vitally interested in it than by proceedings in any court, however constituted."

I think the wheel has long turned now and made its revolution. The words of the Supreme Court have been taken into account when the legislation was passed, and now in fact we are having a conference in the same area that they spoke of back in 1921.

Under Section 8 of the Federal Water Pollution Control Act, the Surgeon General has notified the official State Water Pollution Control Agencies and the interstate agency having jurisdiction in this area, of this conference. These agencies are the New York State Department of Health, who will be represented, we understand, by Dr. Hollis Ingraham. Dr. Ingraham has not yet arrived, but as soon as he comes in we would expect him to take his place around the conference table.

Dr. Ingraham -- welcome indeed, Dr. Ingraham. We were just getting started with our opening remarks, explaining the purpose of the conference.

The New Jersey State Department of Health will be represented by Dr. Roscoe Kandle; the Interstate Sanitation Commission by Mr. Thomas Glenn; the Public Health Service by Mr. Lester Klashman, the Regional Program Director, Water Supply and Pollution Control; and my name is Murray Stein, and I am from headquarters of the Public Health Service.

Representatives of these official agencies are, of course, privileged to bring whoever they wish to the conference and have them participate in it. However, representatives of these official State agencies and the Public Health Service constitute the conference, and under the law this is a conference between these State representatives and the interstate agencies and the Public Health Service.

The States, the interstate agencies, and the Federal Government, have responsibilities in dealing with interstate water pollution control problems. The Federal Water Pollution Control Act declares that the States have primary rights and responsibilities for taking action to abate and control interstate pollution. In addition, the Federal Act provides that we are to encourage action of interstate agencies.

It has always been the policy of the Public Health Service to give full recognition to this traditional role of the States, and the role of the interstate agencies. The function of the Public Health Service is to encourage the States in these activities. However, the Public Health Service is charged by law with specific responsibility in connection with interstate pollution control problems. The Federal Water Pollution Control Act provides that pollution of interstate waters, whether the matter causing or contributing to such pollution is discharged directly into such waters, or reaches such waters after discharge into a tributary of such waters, which endangers the public health or welfare of persons in a State other than that in which the discharge originates, is subject to abatement.

The procedures for abatement are carefully set forth in the Federal Water Pollution Control Act.

The conference will be useful in providing a clear picture of the problem, and in delineating accomplishments, and in indicating what still needs to be done, if anything, to correct the problem of pollution of the interstate waters of the Raritan Bay.

Under the Federal Act the Surgeon General is required at the conclusion of the conference to prepare a summary of it. This summary will be sent to all conferees. The summary, according to law, must include the following:

1. Occurrence of pollution of interstate waters subject to abatement under the Federal Act.

2. Adequacy of measures taken toward abatement of the pollution.

3. Nature of delays, if any, being encountered in abating the pollution.

Where a situation does not lend itself to the covering of all these points at one session, we have held conferences in several sessions. Succeeding sessions are held on the call of the Chairman after a reasonable opportunity has been given to develop additional information. If such proves to be the case here, it is suggested that consideration might be given to designating today's proceedings as the first session of the conference, and scheduling a second session in the future.

Some time subsequent to the holding of the conference the Surgeon General is required to make recommendations for remedial action if such recommendations are indicated to the conferees. This will have to be done upon the conclusion of the conference, depending upon when this conference is concluded. If the conference is concluded today or tomorrow, the Surgeon General will then have to make recommendations, but if it is recessed and continued, the Surgeon General can wait until the conclusion of the last session of the conference before he makes his recommendations. In the past, the Surgeon General, where pollution was found, has always made recommendations in terms of a construction time schedule for remedial action. This time schedule, in almost all cases, has been followed throughout the country. As a matter of fact, I think that as some of you may well know, we measure our success by the number of pollution cases solved by the conference technique rather than by the cases we have to go to court on.

A word about the procedures governing the conduct of the conference. A record and a verbatim transcript will be made of the conference. Mr. Jack Rund is making this verbatim report, for the purpose of aiding us in preparing a summary, and also providing a record of what is being said and done here. We will make copies of the summary and verbatim transcript of the conference available to the State representatives.

For the purposes of maintaining relationships within a region and a State we have found that this is the best way to handle distribution. All others who want copies of this will, we would expect, get in touch with their State representatives. The reason for this is that we would prefer that people who are interested in this problem follow their normal relationships in dealing with the State agencies, rather than dealing with or coming to the Federal Government on these matters. This has worked successfully in the past and we would be happy to make this material available to the States.

All the conferees will be called upon to make statements. The conferees, in addition, may call upon participants they have invited to the conference to make statements also. At the conclusion of such statements the conferees will be given an opportunity to comment or ask questions, and at the conclusion of the other conferees' comments or questions, I may ask a question or so too. In the past this has proved effective in developing a clear statement of the problem and in reaching agreements on equitable solutions.

At the end of all the statements and the questioning, we will have a discussion among the conferees and try to arrive at at least a factual basis of agreement, and then I will attempt to summarize the conference orally, and we will of course give the conferees an opportunity right here to amend or suggest modifications to the summary. After that the summary will be sent out.

Mr. Mincher.

MR. MINCHER: With respect to questions, Mr. Stein, do I assume that the questioning is restricted to the conferees and their designees only?

MR. STEIN: Yes. Generally speaking, the conferees are the only ones who can make comments or ask questions. As you can see, this is a quasi-formal proceeding only, and if a conferee would want to designate any one of their staff members to direct questions, we would be happy to entertain that.

I should indicate that these questions are, we would hope, asked to bring forth the facts. None of the statements here are made under oath. I want to make it clear that no one is obliged to answer any question he does not want to, or if he does not wish to. We hope that the questioning will not be made in a manner analogous to a cross examination, but this is entirely up to the conferees.

Before we turn this over to Mr. Klashman for the Public Health Service statement, we would like to, if you wish, to have the conferees introduce their associates here and other people in the audience, if they wish.

I would just like to make one introduction. I think we are very, very fortunate today to have with us Dr. Alec Langmuir, who is universally recognized as one of the world's outstanding epidemiologists. Dr. Langmuir will be available for consultation and may participate in any fashion that the conferees may wish to avail themselves of.

With that I would like to turn this over to Mr. Lester Klashman.

Do you have any people you would like to introduce before you begin?

STATEMENT OF LESTER M. KLASHMAN, REGIONAL PROGRAM DIRECTOR FOR WATER SUPPLY AND POLLUTION CONTROL, REGION 2, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

MR. KLASHMAN: Yes, I do.

First I would like to introduce Mr. George O'Brien, Deputy Regional Director for the Department of Health, Education, and Welfare.

George, would you mind standing?

Mrs. Bernstein, who is our Regional Attorney.

Mr. Sylvan C. Martin, our Associate Director for Environmental Health Services.

Mr. Richard Mark, who is the Regional Program Director for Environmental Engineering and Food Protection.

Mr. Frank DeMartini, Chief, Field Operations Section, and Deputy Chief of our Technical Services Branch, and

Mr. Ralph Porges, Deputy Chief of Field Operations, both from our Public Health Service Sanitary Engineering Center in Cincinnati, Ohio.

Mr. Paul De Falco, Chief of our Water Resources Section in the Region; and three Federal people representing Federal agencies:

Mr. James Engle, Bureau of Commercial Fisheries, Fish and Wildlife Service.

Commander George Hardy, Third Coast Guard District.

Mr. Robert Wuesterfeld, Assistant to the Supervisor of New York Harbor, representing the District Engineer.

Also Mr. Woodrow Brunson, from our Washington office, the Enforcement Branch, Division of Water Supply and Pollution Control.

Are there any other Federal agencies represented here that I have missed?

That is all, Mr. Chairman.

MR. STEIN: Mr. Glenn, do you have any people you would like to introduce at this point?

MR. GLENN: At my immediate right is the Chairman of the Interstate Sanitation Commission, Mr. Cope; and on his right is Dr. Colosi, the Vice Chairman from New York State.

On my left is Dr. Wendell, who is counsel.

Across the table is Dr. Kandle, who can speak for himself, who is also on our Commission from New Jersey.

MR. STEIN: Thank you, sir. We were just going to call on Dr. Kandle.

Do you have any introductions?

DR. KANDLE: Commissioner H. Mat Adams is our Commissioner of the Department of Conservation and Economic Development, and Mr. Ed Mincher, who sits as counsel to the Department of Health.

MR. STEIN: Dr. Ingraham.

DR. INGRAHAM: I am here representing Dr. Hilleboe with two members of the Department staff, Mr. Dappert at my left and Dr. Thompson, who came down with me this morning.

In addition to that, we have invited participation from the New York State Conservation Department, and I understand Mr. Udell and Mr. Burdick are here.

We have also invited as participants Mr. Maxwell Lehman, the New York City Assistant Administrator. I am not sure whether he will be able to get here or not.

We also invited representation from the New York City Health Department. I believe Professor Ingram is here representing the City Health Department.

Also represented will be participation from the New York City Department of Public Works in the form of Mr. O'Leary, I believe.

MR. STEIN: Thank you, sir.

With that we will call on Mr. Klashman to make the Public Health Service presentation.

Mr. Klashman.

MR. KLASHMAN: For the record, my name is Lester Klashman, Regional Program Director of Water Supply and Pollution Control.

Mr. Chairman and members of the conference: In carrying out our duties under the Federal Water Pollution Control Act, we have evaluated the pollution situations of all interstate waters in our region. Among these is the Raritan Bay and its tributaries.

Several months ago our Public Health Service Communicable Disease Center reported that a substantial number of cases of infectious hepatitis were traced to clams taken from Raritan Bay. As a result of this, and in carrying out our obligations under the Federal Water Pollution Control Act, our office made a preliminary field investigation of the sources of pollution discharging to the Raritan Bay Study area. We also reviewed various reports, studies and surveys that had been made by various city and State agencies concerned and the Interstate Sanitation Commission.

On the basis of these reports, surveys and studies indicating that a water pollution problem existed in the interstate waters of Raritan Bay, on June 29, 1961, the Surgeon General of the Public Health Service called this conference under Section 8 of the Federal Water Pollution Control Act. The Division of Water Supply and Pollution Control asked their staff at the Public Health Service Sanitary Engineering Center to prepare a report on this matter. Mr. Harold Clark, who is at my right, and Mr. F. W. Kittrell, who unfortunately could not be here, of the Sanitary Engineering Center, directed the preparation of this report, and our regional staff assisted them. We want to thank the personnel of the New York State Health Department, New York State Conservation Department, New York City Health, Public Works, and Parks Departments; New Jersey Health Department, Middlesex County Sewerage Authorities and the Interstate Sanitation Commission for making data available to us and cooperating in every way. We have tried to work in a glass house and have offered to let you look at the various drafts of this report as they were prepared. At your request we have discussed specific phases of the report with some of you. Some of your staff members have visited our office, reviewed the entire draft report and are aware of its contents.

I should like to emphasize that our purpose is to carry out our statutory obligations so that any pollution of the interstate waters of the Raritan Bay may be abated and, in so doing, to assist State, interstate and local regulatory and construction agencies to abate pollution.

I should now like to call on Mr. Harold Clark to summarize the report that he has prepared.

MR. STEIN: Before you begin, Mr. Clark, will Mr. Clark and all of the others who make statements, if they do, make available a typed copy of their statement to the reporter? This will facilitate the taking of the record, because at the end of the day I am sure it gets exceedingly difficult, and if we can see that the reporter has copies of this we would be in much better shape. I do think he has a copy of Mr. Clark's statement.

Mr. Clark.

Reproduced from best available copy.

STATEMENT OF HAROLD F. CLARK, DIVISION OF WATER SUPPLY AND POLLUTION CONTROL, SANITARY ENGINEERING CENTER, CINCINNATI, OHIO

MR. CLARK: I am Harold F. Clark, Division of Water Supply and Pollution Control, Sanitary Engineering Center, Cincinnati, Ohio.

The background of this study:

The Lower Bay and Raritan Bay, along with Sandy Hook Bay, combine to form a triangular body of tidal water. It extends inland for about 10 miles between Staten Island, New York, to the northwest, and an east-west shoulder of New Jersey to the south.

I would like to present Government's Exhibit No. 1 at this time.

MR. STEIN: Would you mark these, if you can, Government's Exhibit 1, or G. E. No. 1.

A VOICE: Mr. Chairman, it is very difficult to hear back here. I wonder if Mr. Clark will make an effort to speak louder?

MR. STEIN: Yes, will you try to?

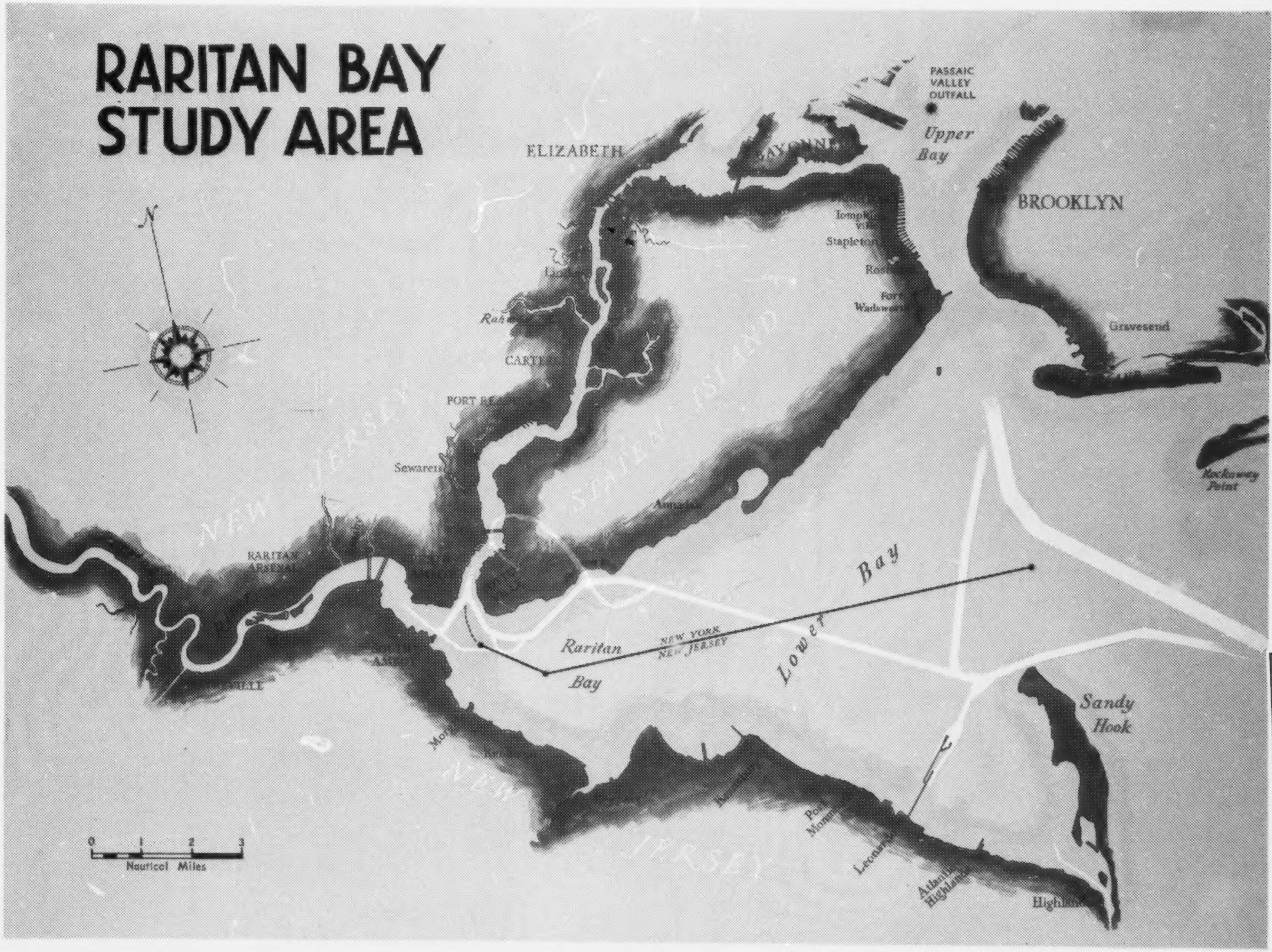
MR. CLARK: Yes. If I don't make myself heard, interrupt again.

(The document referred to, a map entitled "Raritan Bay Study Area" was marked for identification Government's Exhibit No. 1.)

MR. CLARK: The boundary between the two States passes approximately from east to west through the middle of the bay area to the western end, where it swings to a northerly direction and continues up the Arthur Kill. The Arthur Kill is a relatively narrow body of water connecting Raritan Bay, at its southern end, with Newark Bay, at its northern end. Arthur Kill forms the western border of Staten Island and the Eastern border of this portion of New Jersey.

The bay area and Arthur Kill constitute an extremely important water resource to the one and one-half million persons residing in the four adjacent counties. About one and one-quarter million live in the three New Jersey counties, and another one-quarter million live in the New York county. Tremendous quantities of cargo are transported on these waters. They provide recreation in the form of bathing, pleasure boating, fishing, picnicking and scenic enjoyment. Industries withdraw large quantities of water for cooling processes. These waters support commercial fishing and clamming. The Bay area receives for final disposal the waste waters from the human population and the industries that occupy the adjacent land area.

Reproduced from best available copy.


RARITAN BAY
STUDY AREA
N
ELIZABETH
BAYONNE
PASSAIC VALLEY OUTFALL
Upper Bay
BROOKLYN
Stapleton
Fort Wadsworth
Gravesend
Rockaway Point
STATEN ISLAND
NEW JERSEY
CARTERET
Sewaren
RARITAN ARSENAL
Raritan Bay
NEW YORK
NEW JERSEY
Lower Bay
Sandy Hook
Atlantic Highlands
Highlands
0 1 2 3
Nautical Miles

Government Exhibit 1

The value of these waters and the need for maintaining good water quality to protect those who use them has long been recognized. Evidence of this is reflected by the construction of sewage treatment plants during the past 30 to 35 years, at a rate of nearly one per year. Information on the efforts of industry to control their wastes was not available for this report.

The water quality of both Arthur Kill and the Bay area has become degraded despite the continued activities to control pollution. This fact is documented by a number of reports and records of agencies dealing with the pollution problem in the area. One of the several effects of water quality degradation was demonstrated dramatically when, in early 1961, a number of cases of hepatitis resulted from consumption of clams taken from Raritan Bay.

Several reports have dealt with water quality and others have dealt specifically with the effects of pollution on shellfish growing areas. The following is a partial listing and brief summary of the more recent of these reports:

1. Southern Arthur Kill Survey - 1955

From 1955 to 1957 the Interstate Sanitation Commission conducted three studies on the water quality of Arthur Kill. The first of these studies took place during September and October of 1955. The report pointed out that the pollution in the vicinity of Tottenville was from three main sources, Tottenville, Woodbridge Creek, and the effluent from the Woodbridge sewage treatment plant. It was concluded that "pollution conditions are generally worse as one proceeds northward up Arthur Kill especially as regards dissolved oxygen concentrations."

2. Study of Pollution in Arthur Kill - 1956

The second study conducted in 1955 and 1956 stated that more than 80 percent of the biochemical oxygen demand load in Arthur Kill originated in the northern third. It also mentioned that "the use of the Kill as a source as well as a recipient of ... cooling waters tends to increase the temperature of the Kill above that normally encountered in tidal waters in this area." The report went on to mention that at the lower end of the Kill (a class "A" water), Arthur Kill failed to come up to the Tristate Compact standards for dissolved oxygen 30 percent of the time.

3. Interstate Sanitation Commission Annual Report - 1958

The third study was conducted in June and July of 1957 to determine conditions existing throughout the Kill. Samples were collected and analyzed for dissolved oxygen, chlorides, pH, and temperatures. The results obtained indicated that the Interstate Sanitation Commission Compact requirements for dissolved oxygen in class "B" waters were not being met for

60 percent of the Kill's total length. The greatest pollution occurred at a point 8.3 miles above Raritan Bay. It was also stated that a "slug" of pollution approximately 6.4 miles in length was located in the Kill. This slug moves "to and fro with the ebb and flood of the tide."

4. Review Copy of New York City Water Survey Series, Report No. 3 - Arthur Kill-Kill Van Kull - June 1960

This report was prepared by Hazen and Sawyer for the classification of Arthur Kill and Kill Van Kull by the New York State Water Pollution Control Board. The report summarizes the condition of the waters of Arthur Kill as "...generally grossly polluted." Furthermore, the report states that "the quality of waters in Arthur Kill and Kill Van Kull at present is almost wholly a function of the sewage and industrial waste load imposed from New Jersey."

5. Recommended Classification of Surface Waters in the Area of and Including West and Lower Bay and Raritan Bay - June 1960

This report was prepared by the New York State Conservation Department - Shellfisheries Management Unit for the New York State Water Pollution Control Board. The report reviewed present conditions in Raritan and Lower Bays and found the following areas to be polluted:

> The waters lying east of a line running in a north-south direction from Great Kills harbor to the New York-New Jersey State line; also those waters of New York State lying west of Princess Bay.

Numerous other reports, listed in the bibliography -- which I submit for the record as Government Exhibit, Bibliography I -- have been written by local, State and Federal agencies on Raritan Bay and the surrounding waters. In general, it may be stated that the conclusions reached by the various authors of these reports have shown that pollution of the waters of Raritan Bay and associated water courses has resulted from discharges of domestic and industrial wastes from New York and New Jersey.

THE AREA

The land area of the region considered in this conference involves Richmond County in New York, and the counties of Middlesex, Monmouth, and Union in New Jersey. The area is outlined by a line in Government's Exhibit No. 1, extending from Elizabeth, New Jersey, across Arthur Kill and Staten Island to Fort Wadsworth, then on across the Narrows to Fort Hamilton in Brooklyn, turning south to Fort Hancock on Sandy Hook, and finally swinging in an elongated arc from Highlands through New Brunswick and Highland Park, New Jersey, back to Elizabeth.

The water area under consideration is an important part of the New York Harbor complex, the largest seaport in the world. Much of the seaport navigation traverses these waters.

The 1.5 million population, living within an hour's drive of the Bay, has ready access to its waters for both recreation and commercial pursuits. As a consequence, the water uses include every category applicable to saline waters. Most of the large industries of the area are situated along the Arthur Kill, principally on the New Jersey side.

The water area under consideration includes the Narrows, the Arthur Kill, the tidal portions of Raritan River and other smaller tributaries to the Bay, and Raritan, Lower and Sandy Hook Bays. The Bay area receives drainage directly from Arthur Kill and its tributaries, the Raritan River, and several smaller streams on Staten Island and on the New Jersey coast from the Highlands to South Amboy.

The area of the Bay, west of a line from the center of the Narrows to Sandy Hook, is approximately 30 square miles, which is about equally divided between the two States. The depth of water varies from 7 to 25 feet, with the exception of the navigation channels, which have depths up to 35 feet. The mean tidal range is 4.9 feet. The ebb and flow of the tides and the physical boundaries of the Bay area lead to a generally circular clockwise pattern of water flow throughout much of the Bay. Many current studies have led to the conclusion that water, and incidentally pollution, entering the Bay at almost any point ultimately may travel to almost all other points in the Bay.

HYDROGRAPHY

In an effort to more clearly define and demonstrate the combined effects of the fresh water flow, the ebb and flow of the tide, and the location and direction of the various channels, several agencies have performed studies including model tracer and float studies. Mixing and dispersion characteristics were studied in the New York Harbor model of the U. S. Army Corps of Engineers, located at Vicksburg, Mississippi. Tracers were introduced into the model at six locations in the New York area. Of particular interest were studies to determine mixing and dispersion when tracers were added to:

1. the confluence of the Rahway River, and the Arthur Kill;

2. a point just north of the Narrows; and,

3. a point approximately 15,000 feet southeast of the Narrows.

In each instance, the tracer was found throughout the rest of the harbor at various concentrations after 15 tidal cycles.

Prototype float studies were also performed by several agencies. Float studies give evidence of the existence of tidal patterns at the time and depth covered by the observations which may influence the dispersion of pollutants. One investigation indicated that pollutants from the Owls Head and Passaic Valley Plants can reach the Staten Island beaches in one tidal cycle.

I now submit Government's Exhibits 2 and 3.

(The document referred to, a map entitled "Float Studies, August 1958, New York State Department of Health," was marked for identification Government's Exhibit No. 2.)

(The document referred to, a map entitled "Float Studies, September 1958, New York State Department of Health," was marked for identification Government's Exhibit No. 3.)

MR. CLARK: Government's Exhibit 2 indicates that three pairs of floats released around ebb current passed through the Narrows, turned in a clockwise manner and swirled back towards the beaches along the Staten Island shore. One of these floats went aground at South Beach within five and one-half hours after being released.

Government's Exhibit 3 shows the path of two pairs of floats released under similar current conditions.

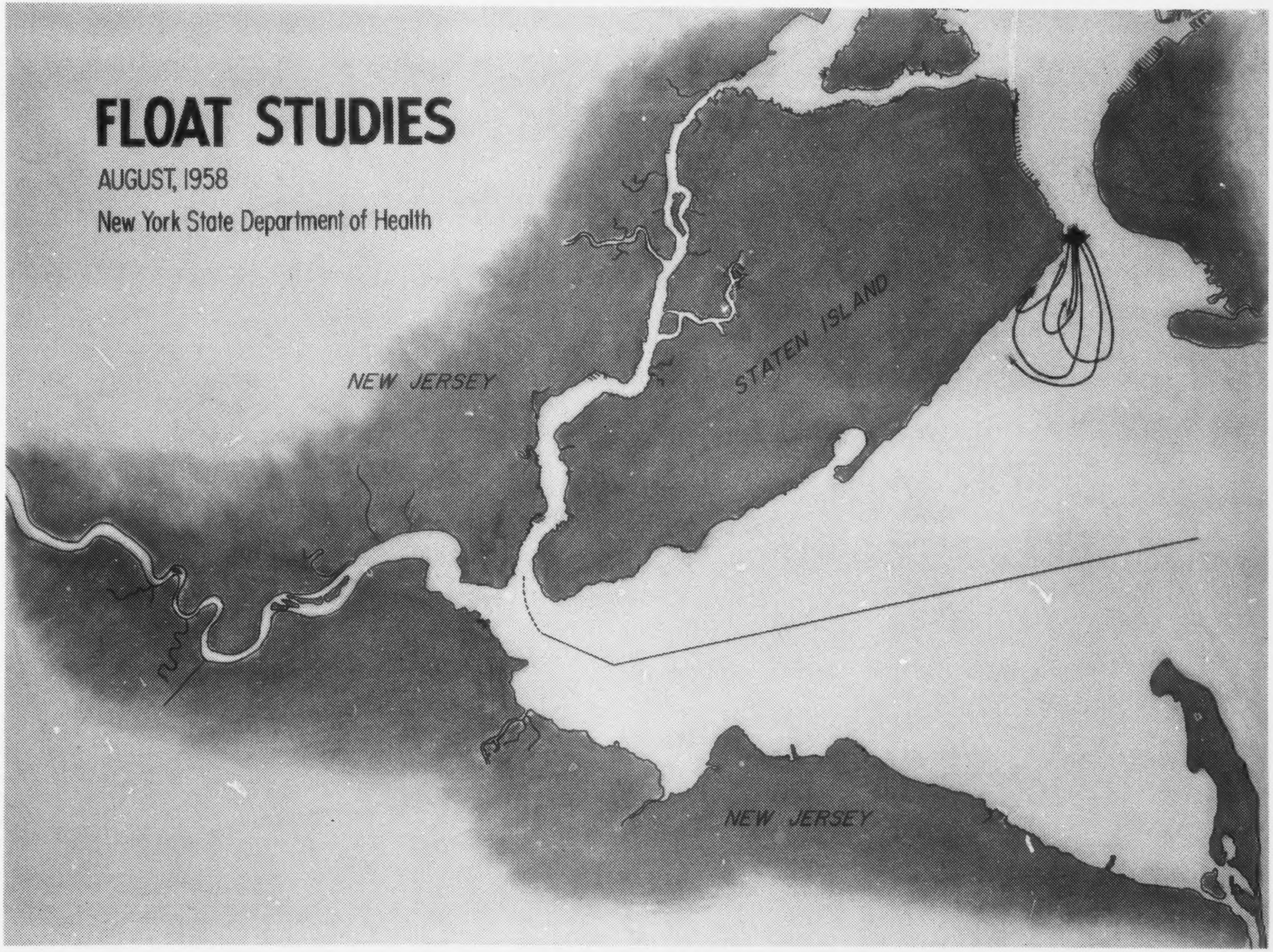
Studies in the vicinity of West Bank Light were performed by the New York State Conservation Department to determine the direction of tidal transport of mixed Upper Bay and Atlantic Ocean waters during flood tide.

I submit Government's Exhibit 4.

(The document referred to, a map entitled "Float Studies, 1951, New York State Conservation Department," was marked for identification Government's Exhibit No. 4.)

MR. CLARK: These float studies appear to confirm the model study and indicate that waters leaving the Narrows can be transported across the State line, deep into Lower Bay.

Floats were also released in the western portion of Raritan Bay to determine the ebb tide drift of waters from Raritan Bay and the Arthur Kill. These floats "...indicated that fresh water from the Raritan River flows seaward and along the channel area to approximately Bell #13 (the point where the channel turns north) and then continues south of the main channel. It also indicated that very little fresh water entering the embayment from



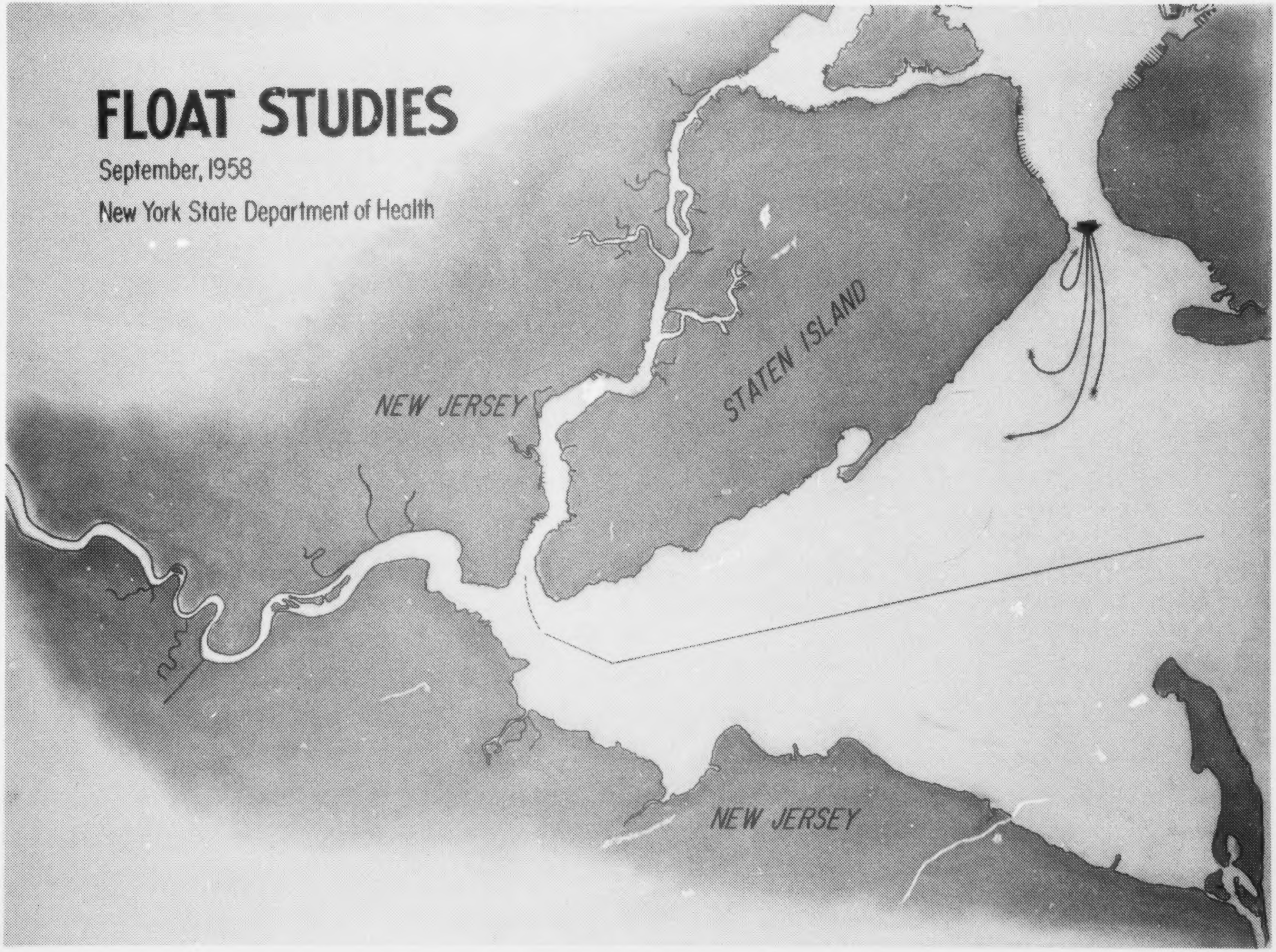
FLOAT STUDIES

AUGUST, 1958

New York State Department of Health

NEW JERSEY
STATEN ISLAND
NEW JERSEY

Government Exhibit 2



FLOAT STUDIES

September, 1958

New York State Department of Health

NEW JERSEY
STATEN ISLAND
NEW JERSEY

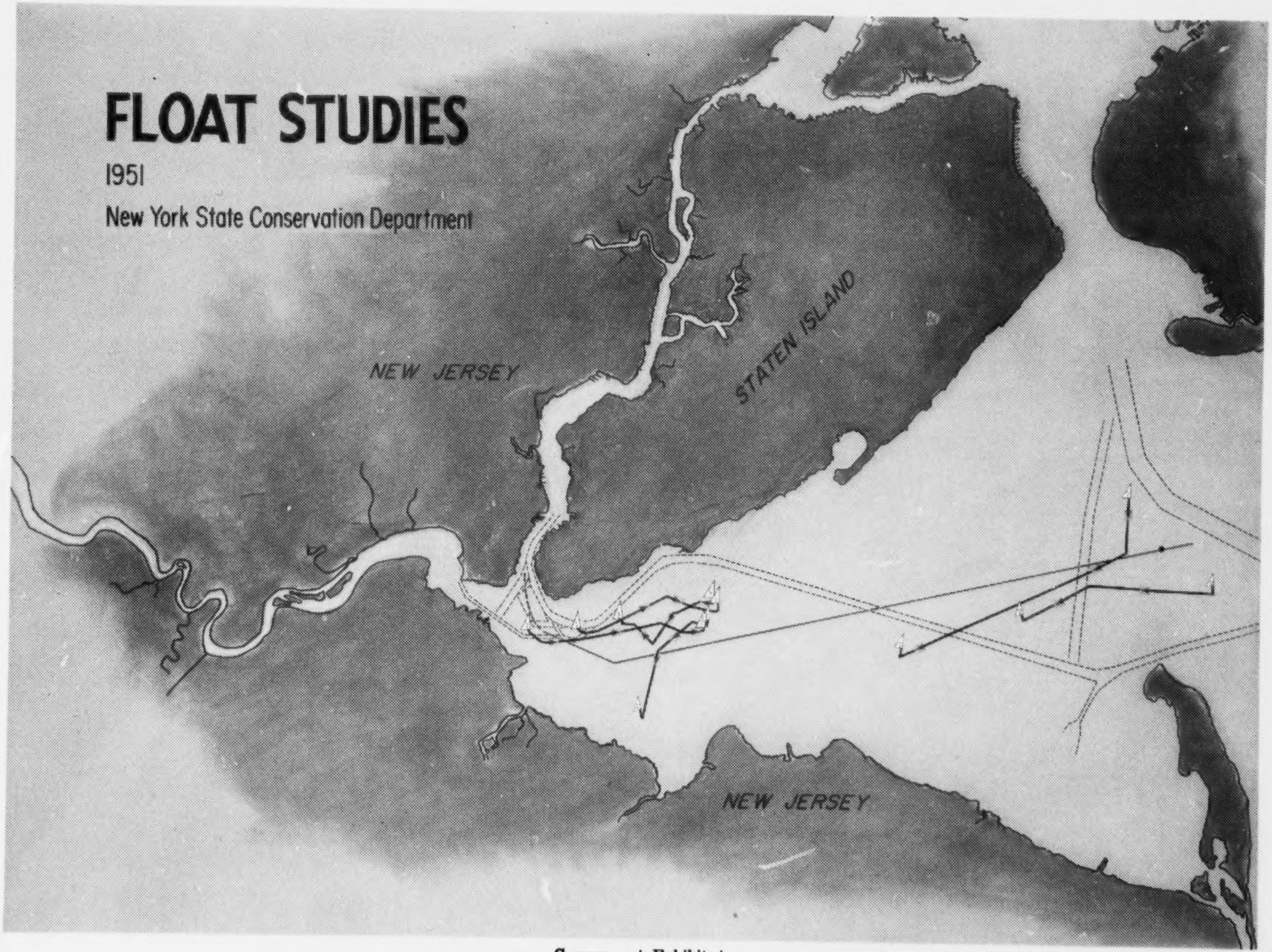
Government Exhibit 3

12-b

FLOAT STUDIES

1951

New York State Conservation Department


NEW JERSEY
STATEN ISLAND
NEW JERSEY

Government Exhibit 4

12-c

the Raritan River returns to the river on the flood tide."[1] This and the following footnotes refer to the numbered entries in the bibliography.

The next point is discussion of water uses. The importance of the water area under consideration to the surrounding population is reflected by their extensive use of these waters. The many and diverse uses reflect both the potential for pollution of the waters through some of these activities, and the potential damages and hazards of use where the resulting pollution is not adequately controlled.

SHIPPING

New York has long been recognized as the nation's leading port in tonnage handled and passengers carried. In 1959 the port of New York handled about 100,000,000 short tons of waterborne commerce entering and leaving through the lower entrance channels, that is, The Narrows, Raritan River, Arthur Kill. There were over 36,000 vessel trips recorded and about 1,000,000 passengers transported. The Arthur Kill handled approximately 18,000,000 tons of this total with 2,000 vessel trips.

I submit Table 1 as Government's Exhibit Table 1.

(The document referred to, a table entitled "1959 Study Area Data," was marked for identification Government's Exhibit Table 1.)

MR. CLARK: But, total tonnage entering and leaving the harbor area is only one part of the broader picture. There is a great deal of activity generated by intraport shipping.

Further expansion of the Arthur Kill's facilities is contemplated. A recent newspaper article described future improvements including "the widening of the Arthur Kill channel to a minimum width of 800 feet, instead of 400 feet and 500 feet now in certain areas, and a deepening throughout the channel of forty and forty-five feet."[2] The Linden-Rahway-Woodbridge area of New Jersey, which the Arthur Kill serves, is the largest oil refining and oil storage center on the eastern seaboard.

Smaller, but still very significant amounts of tonnage, are regularly handled by the New Jersey shore ports located from Sandy Hook Bay to Raritan Bay. Sandy Hook Bay handled nearly 60,000 tons of inedible fish and petroleum products in 1959.

I submit Government's Exhibit 5.

(The map referred to, entitled "Water Uses," was marked for identification Government's Exhibit No. 5.)

MR. CLARK: Government Exhibit 5 presents the existing and proposed public parks and bathing beaches, and the marinas (boat mooring facilities) along the New York and New Jersey shores surrounding the Bay area.

At present, about one-fourth of New York City's total public bathing beach frontage is represented by South Beach, Great Kills Park, and Wolfe's Pond Park along the southeastern Staten Island shore. Average park attendance during 1959 and 1960 was 720,000 per year. The three parks were built at a cost of 10.6 million dollars, and are estimated to have a present property value of more than 14 million dollars, as explained in Table 2, which I submit at this time.

(The document referred to, entitled "Staten Island Beach Facilities, Table 2," was marked for identification as Government's Exhibit Table 2.)

MR. CLARK: Maintenance and operation costs for the past two years were over $700,000, with an income to the city of $93,000. In addition to the public bathing beaches, there are many private beaches, and substantial bathing occurs along the remaining shore line surrounding the Bay.

There are 14 New Jersey beaches, which are fairly equally spaced from Highlands to South Amboy. There is considerable boating along the New Jersey shore.

The next subject is boating. Pleasure boating has increased more rapidly than any other type of aquatic recreation in recent years. Between 1951 and 1960 national expenditures for pleasure boating quadrupled, to more than 2.5 billion dollars by 1960. In 1959 New York and New Jersey ranked first and fourth, respectively, in pleasure boats registered. The two States combined registered nearly 50,000 of the national total of about 540,000 boats. It is estimated that about 1,000,000 persons in the metropolitan area use pleasure boats, exclusive of sailing craft, and that a minimum of 10 percent, or 100,000 persons, boat on the water area under consideration.

Recent Corps of Engineers' statistics show that more than 400,000 passenger trips were attributed to boats sailing out of Sandy Hook Bay, Cheesquake Creek, Matawan Creek, and Shrewsbury River in New Jersey.

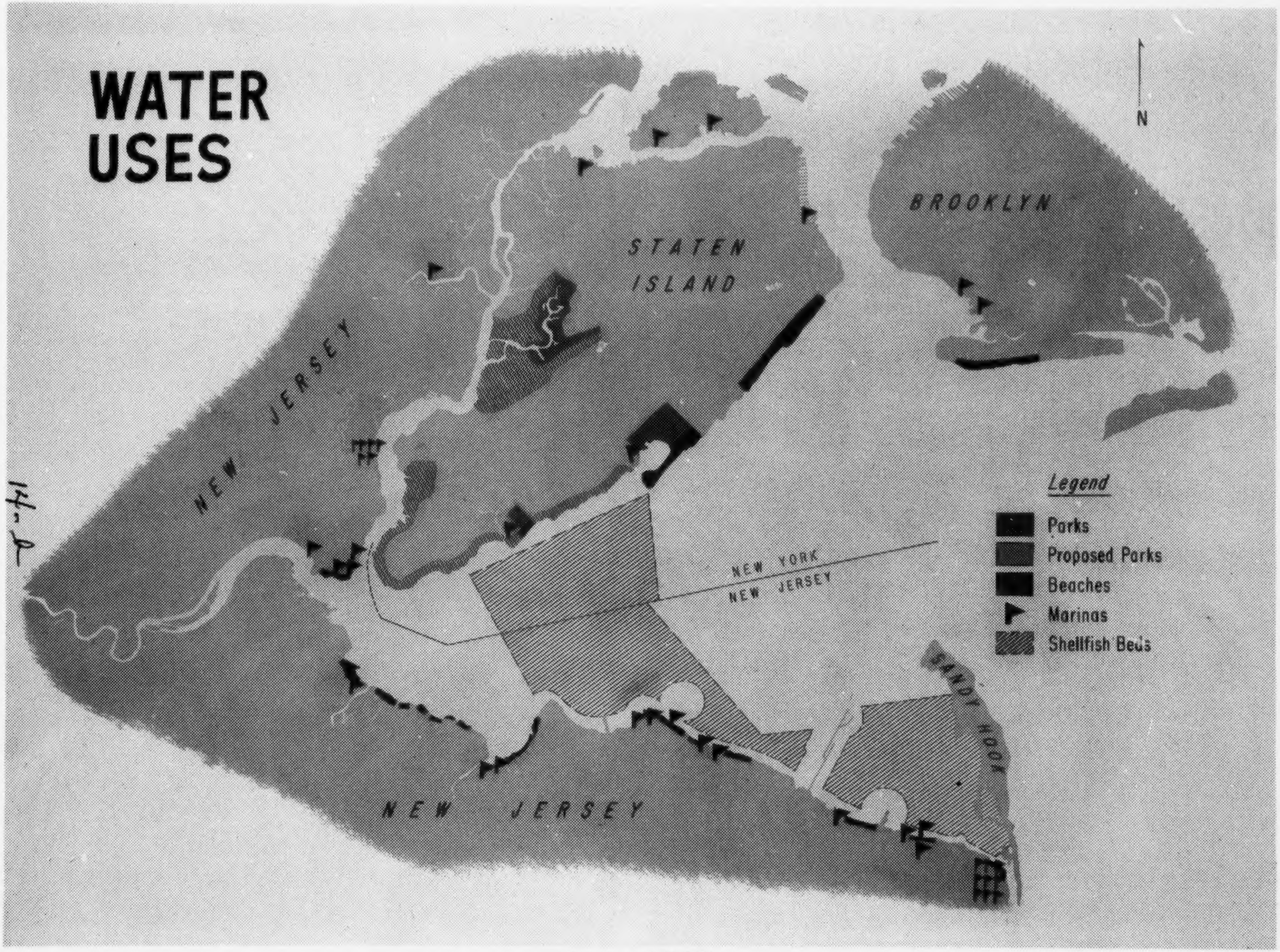
With the increase in pleasure boating, water skiing has also become increasingly popular. The hazard of ingesting contaminated water in a polluted area is even greater for the skier than it is for the boater.

In the Bay area there are about 45 recognized marinas, as will be pointed out on Government's Exhibit 5, providing over 2,500 berths for pleasure and commercial craft. At an average cost of $2,500 per pleasure boat this would amount to an investment of $6,250,000.

TABLE 1

1959 STUDY AREA DATA

Area	Tons Handled	Vessel Trips	Passengers
New York and New Jersey Channels	80,805,095	149,346	1,750,153
Thru Traffic	25,846,556		
Raritan River	7,163,897	30,492	356,123
Thru Traffic	82,365		
Shoal Harbor and Compton Creek, New Jersey	55,068	2,428	
Cheesequake Creek, New Jersey		14,400	25,250
Great Kills Harbor, Staten Island		116,960	123,136
Shrewsbury River, New Jersey		22,320	188,480
Sandy Hook Bay, New Jersey		6,346	


WATER
USES
N
BROOKLYN
STATEN
ISLAND
NEW JERSEY
NEW YORK
NEW JERSEY
NEW JERSEY
SANDY HOOK
Legend
Parks
Proposed Parks
Beaches
Marinas
Shellfish Beds

14-d

Government Exhibit 5

TABLE 2

STATEN ISLAND BEACH FACILITIES

Acreage Beaches and Facilities		Picnic Facilities: Tables	Picnic Facilities: Benches	Picnic Facilities: Fireplaces
Great Kills	1246.00	---	---	--
Wolfe's Pond	224.365	114	228	32
South Beach	638.5	33	66	--
Total	2108.865	147	294	32

Capital Expenditures for Construction		Approximate Property Value
Great Kills	$ 1,750,000	$ 3,935,500
Wolfe's Pond	100,000	1,029,600
South Beach	8,784,000	9,372,450
Total	$10,634,000	$14,337,550

	Maintenance and Operation Costs per year (2 years) 1959	Maintenance and Operation Costs per year (2 years) 1960	Gross Receipts from Refreshment Stands and Related Concessions 1959	Gross Receipts from Refreshment Stands and Related Concessions 1960
Great Kills	$106,564	$105,184	$18,521	$18,400
Wolfe's Pond	47,798	49,531	10,000	12,000
South Beach	198,865	200,735	25,150	37,000
Total	$353,227	$355,450	$53,671	$67,400

2-Year Total - $708,677

(The City's revenue is about 10% of the gross receipts.)

Income from Parking, Bathhouse, Beach Admissions, etc.

	Parking	Bathhouse	Admissions
1959			
Great Kills	$16,134.00	$2,742.50	---
Wolfe's Pond	8,728.00	---	---
South Beach	4,158.50	1,006.90	$ 8,196.20
1960			
Great Kills	17,175.00	2,443.20	---
South Beach	7,693.00	1,597.90	13,896.40
Wolfe's Pond	7,984.50	---	---

2-Year Total of all income - $91,756.10

The recent growth in pleasure boating in this area is illustrated by the experience of New York City's new public marina on Staten Island. In 1959, when the marina opened, it berthed 70 boats for gross receipts of $3,275. In 1960 the marina berthed 198 boats representing a threefold increase for gross receipts of $9,075.

The increase in private pleasure boating, and better highway facilities may partially account for a reduced interest in excursion boating. Before World War II many steamboats, often filled to their 2,000 passenger capacities, made regular trips from the Battery at the tip of Manhattan to Keansburg, New Jersey. Now one boat makes this trip two or three times daily, with less than 500 passengers per trip.

The next subject is fishing. Some of the most popular fishing grounds in the United States are in the waters of the Metropolitan New York Harbor Area. The New Jersey Fish and Game Department reported a total commercial and game fish catch of 28.7 million pounds in 1956 in the Sandy Hook-Raritan Bay area.

In 1952 the New Jersey Department of Conservation and Economic Development reported the following conditions relative to fishing on Raritan, Sandy Hook and Lower Bays:

> "Although there is considerable pollution in Raritan Bay, porgies, fluke, flounders, weakfish and some bluefish are taken there. Lower New York Bay and Sandy Hook Bay are heavily fished by boats of all descriptions. Among the species taken are flounders, porgies, fluke, bluefish, snapper blues, striped bass, weakfish, croakers and crabs.
>
> "Twenty-nine rowboat and U-drive liveries are scattered throughout this area, and party and charter boats leave from Morgan, Leonardo, Highlands, and Atlantic Heights. The area also is fished by boats sailing from Staten Island, The Battery, and Long Island Ports."[3]

WILDLIFE

Wild ducks are the principal wildlife game species of the Bay. In February 1957, two accidental oil spills, one at Perth Amboy, and the other at Carteret, New Jersey, wiped out an estimated 12,500 ducks of the estimated 75,000 duck population in the area.

SHELLFISH

The shellfish beds in the Raritan Bay area constituted an important commercial source of clams prior to 1925. As shown on Government's Exhibit 5, one bed occupied much of the western end of the Bay area under consideration, and straddled the New York-New Jersey State line. A smaller bed occupied Sandy Hook Bay in the angle formed by the northern shoulder of New Jersey and Sandy Hook peninsula.

In the past years the Bay area has been an important source of clams. Contamination of the waters by raw sewage had become so great that health authorities closed the Bay to shellfishing in 1925. As sewage treatment plants were placed in operation and the levels of contamination were apparently reduced, the New Jersey authorities permitted reopening of a portion of the New Jersey beds in 1934. Subsequently, a portion of the New York beds was reopened in 1941 with an estimated 175,000 bushels of clams being taken from the Bay that year. Based on 1961 prices, it is estimated that the 1940 yield of clams would have a current value of approximately one million dollars.

From 1950 the receipts in the New York market of clams taken from the beds decreased, with the 1960 receipts estimated at 29,000 bushels, worth about $175,000. I ask you to examine Table 3 at this time.

(The document referred to, entitled "Table 3, Clam Receipts from Raritan Bay in N. Y. Market," was marked for identification Government's Exhibit Table No. 3.)

MR. CLARK: These beds represented the last approved locations available in the immediate New York area for the taking of clams.

Clams characteristically feed by pumping water in which they are submerged to their gills from a siphon, or opening, through their shells. Particulate materials and minute living organisms in the water, including plankton, bacteria, and viruses, are passed through the gills to the mouth, and thence into the digestive system. Some of this food material is concentrated on the surfaces of the gills and on the membrane lining the shells, and consequently is present in the shell liquor. If enteric pathogenic organisms or viral agents from sewage are present in the water overlying a clam bed they may become concentrated in the intestines and shell liquor of the clams. Persons eating such clams raw may be infected by any disease organisms present.

During early 1961 substantial numbers of cases of hepatitis were traced to clams taken from Raritan Bay. A press release issued by the New Jersey State Department of Health on May 1, 1961, stated that,

> "Dr. Roscoe P. Kandle, State Commissioner of Health, today closed the New Jersey controlled portions of Raritan Bay and Sandy Hook Bay and also the Navesink and Shrewsbury Rivers to the taking of shellfish.
>
> "Dr. Kandle said of 186 hepatitis cases who had a history of eating raw clams in one or two restaurants, 85

TABLE 3

CLAM RECEIPTS FROM RARITAN BAY IN N. Y. MARKET

Year	Number of Bushels	Value (Based on 1961 prices)
1948	15,000	$ 90,000
1949	40,000	240,000
1950	50,000	300,000
1951	38,000	228,000
1952	28,000	168,000
1953	26,000	150,000
1954	26,000	150,000
1955	22,000	132,000
1956	20,000	120,000
1957	22,000	132,000
1958	23,000	138,000
1959	25,000	150,000
1960	29,000	174,000

Conversion factors published by the U. S. Dept. of the Interior, Bureau of Commercial Fisheries show that one bushel of hard clams is equal to 11 pounds average weight. Also the price range for April, 1961 showed a $3 1/2 to 5 for chowder hard clams, $7 1/2 - 8 1/2 for cherrystones and $10-13 for little necks, (per bushel). An average price of $6 per bushel was used in computing the values in the above-list.

On the basis of $6 per bushel and using the 175,000 bushels given previously for 1940 the revenue derived from shell-fishing then (1940) was about $1,050,000.

are known to have eaten raw clams traced to Raritan Bay.

"'In the face of this and other evidence, I have no alternative except to close the indicated areas to the taking of shellfish until further notice.'"

Subsequently, on June 2, 1961, the Sandy Hook Bay bed was reopened.

A representative of the New York State Conservation Department informed a Public Health Service investigator that as a result of studies indicating pollution of the growing beds in the New York portion of Raritan Bay, they also closed these shellfish beds on May 1, 1961.

SOURCES OF WASTES

The Narrows, Arthur Kill, Raritan River, Raritan Bay and Lower Bay water area receive raw and treated sewage and industrial wastes from the adjacent land area in both New York and New Jersey. The approximate land area involved includes 36 square miles in New York and 200 square miles in New Jersey.

The combined waste discharged directly to the water area from both States has an estimated biochemical oxygen demand population equivalent of 2,100,000.

SEWAGE

One borough in New York and 70 communities in New Jersey discharge their sewage and industrial wastes to the waters under consideration. An estimated total of 1,282,000 persons contribute sewage to the 30 sewerage systems involved. Of these 1,190,000, or 93 percent, live in New Jersey, and 92,000, or 7 percent, in New York.

I submit at this point as Government's exhibits, Tables 4 and 5.

(The document referred to, entitled "Table 4, Sewage Treatment Plants Tributary to The Raritan-Lower Bay and Arthur Kill Study Area" was marked for identification Government's Exhibit Table No. 4.)

(The document referred to, entitled "Table 5, Summary of Sources of Wastes," was marked for identification Government's Exhibit Table No. 5.)

MR. CLARK: Tables 4 and 5 incorporate available information on the sewerage systems, including sewered populations, sewage flow, types of treatment facilities, receiving waters, and results of inspections of treatment plant operations.

I submit Government's Exhibit 6, which shows the locations of the points of sewage discharge, and I would like the Appendix detailing plant performance and the Appendix showing the treatment symbols submitted as Government Exhibits Appendices A and B.

(The map referred to, entitled "Wastes Sources, Raritan Bay and Arthur Kill," was marked for identification Government's Exhibit No. 6.)

MR. CLARK: Government's Exhibit 6 shows the locations of the points of sewage discharge. I need Exhibit 6 and Tables 4 and 5. Would you list these, Mr. De Falco?

MR. DE FALCO: We have Fort Hancock, Atlantic Highlands, Leonardo Naval Depot, Keansburg, Keyport, Matawan Township. Matawan Township here also. Sayreville, Middlesex County.

I'm sorry, this is South Amboy, Sayreville-Morgan, and Sayreville-Melrose, Raritan Arsenal. Camp Kilmer.

MR. STEIN: Let the record show that when Mr. De Falco named these locations he pointed them out on the chart, Government's Exhibit 6, and any subsequent locations will be similarly pointed out on the chart by Mr. De Falco.

MR. DE FALCO: Woodbridge, Perth Amboy, Woodbridge again, Carteret, Rahway Valley, Linden-Roselle, Elizabeth Joint Meeting, Willowbrook State Hospital.

MR. GLENN: Wait a minute. That should be corrected. Willowbrook is up by Pryor's Island. It's up there a little bit further than you pointed. Right there it comes in.

MR. DE FALCO: No. We were informed by your staff it was at Fresh Kills Junction. The Tottenville area. Mount Loretto, Richmond Memorial, S. S. White, Oakwood Beach.

MR. CLARK: Thank you.

EFFLUENT STANDARDS

The Interstate Sanitation Commission Compact contains standards of performance and of effluent quality for treatment plants under its jurisdiction. For plants discharging into Class A waters the coliform bacteria shall not exceed 1 per milliliter in more than 50 percent of the samples and suspended solids shall be reduced by 60 percent. For plants discharging into Class B waters there are no coliform bacterial limits and suspended solids shall be reduced by 10 percent. Most of the Bay waters are classified as Class A while those of Arthur Kill above Outerbridge Crossing and the Upper New York Bay above the Narrows are Class B.

TABLE 4

SEWAGE TREATMENT PLANTS TRIBUTARY TO THE RARITAN-LOWER BAY AND ARTHUR KILL STUDY AREA

Municipality or Industry	Sewered Pop.	Average Flow	Design Flow	Date Built	Treatment	Stream
New Jersey						
Highlands	3,000 W 12,000 S	0.4	1.2	1928	SCEB	Shrewsbury River
Atlantic Highlands	3,100 W 6,000 S	0.4	0.6	1928	CEB	Sandy Hook Bay
Leonardo Naval Depot	130	-	-	1940	CEB	Raritan Bay
Keansburg	5,600 W 15,000 S	1.4	2.0	1949	SKCEDV	Raritan Bay
Keyport	5,900 W 17,000 S	0.8	0.4	1936	SCEDB	Raritan Bay
Matawan	2,700	-	-		CEB	Matawan Creek
Matawan Township	1,000	0.13	0.25		CAEDB	Matawan Creek
Knollcroft	850	-	0.2	1960	SCE	Raritan Bay
Sayreville-Morgan	2,000	0.1	0.3	1951	SCDE	Raritan Bay
South Amboy	8,400	0.7	1.0	1940	SCEDB	Raritan Bay
Sayreville-Melrose	1,000	0.05	0.1	1949	SCEDB	Raritan River
Middlesex County Sewerage Authority	300,000	40.00	52.0	1957	SGCKEX	Raritan Bay
Camp Kilmer	1,000	1.0	6.0		CFCE	Tributary to Raritan River
Raritan Arsenal	2,700	0.34	-		CFE	Raritan River
Woodbridge-Keasby	8,000	0.15	1.35		SGCFEDB	Kinsey's Creek to Raritan River
Perth Amboy	41,300	7.0	10.0	1934	SKCFEZV	Raritan River
Woodbridge-Sewaren	21,000	2.2	10.0	1954	SGCKEV	Arthur Kill
Cartaret	13,000	2.4	3.0	1953	SGKCFEZV	Arthur Kill
Rahway Valley	170,000	22.5	16.7	1928	SGECDB	Arthur Kill
Linden Roselle	120,000	12.2	12.5	1952	SGCXH	Arthur Kill
Elizabeth Joint Meeting	475,000	52.0	100.0	1937	SGCTHX	Arthur Kill
New York						
Willowbrook	4,000	0.6	0.6	1941	C	Fresh Kills
Mt. Loretto Home #1	1,200	0.09	0.1	1937	CE	Raritan Bay
Mt. Loretto Home #2	350	0.03	0.045	1937	C	Raritan Bay
Marist Fathers	35	-	-		C	

(Continued)

TABLE 4 (Continued)

SEWAGE TREATMENT PLANTS TRIBUTARY TO THE RARITAN-LOWER BAY AND ARTHUR KILL STUDY AREA

Municipality or Industry	Sewered Pop.	Average Flow	Design Flow	Date Built	Treatment	Stream
Richmond Memorial Hospital	300	0.010	0.010	1936	CE	Raritan Bay
Saint Joseph's Home	40 W 200 S	0.004	-		C	Raritan Bay
Oakwood Beach	85,000	9.90	15.0	1956	SGACETDX	Lower N.Y. Bay

W - winter, S - summer. Key to Treatment Code in Appendix F.

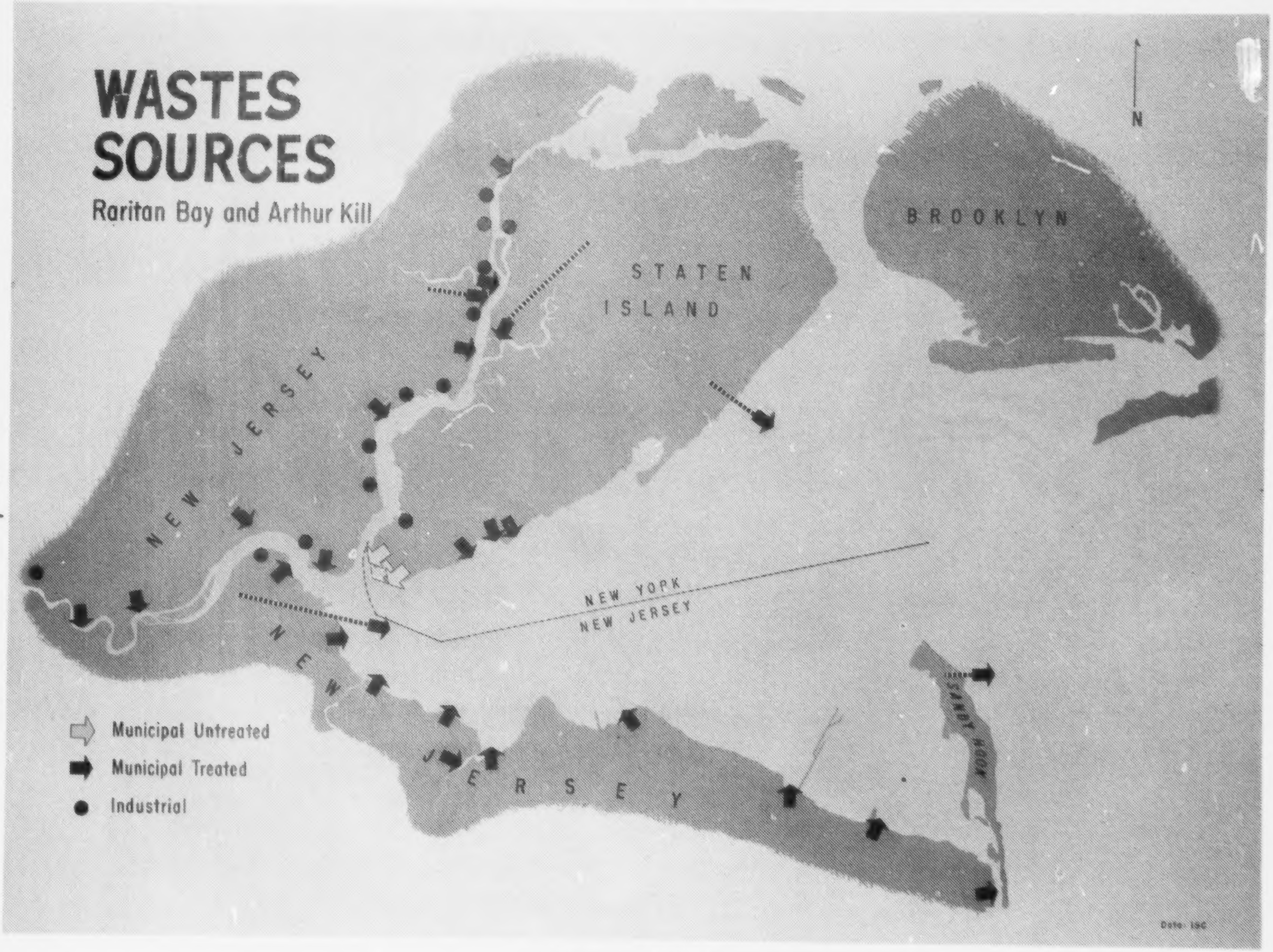
TABLE 5

SUMMARY OF SOURCES OF WASTES

Community	Population Equivalent Discharged		Failures to Meet ISC Standards		Overflow or By-Pass	Overload or Near Capacity
	SS	BOD	SS	Coli		
New Jersey						
Highlands	1,231	1,955	7/14	0/14	No	Yes*
Atlantic Highlands	1,136	2,462	9/14	3/13	No	Yes*
Leonardo N. D.	7	12	0/2	2/3	No	No
Keansburg	9,822	4,736	11/13	9/13	Yes	Yes
Keyport	2,319	5,456	9/13	9/12	Yes	Yes
Matawan	NA	NA	-	-	-	-
Matawan Township	NA	NA	-	-	-	-
Knollcroft	No Samples	Taken	-	1/1	No	No
Sayreville-Morgan	343	900	0/2	0/8	No	No
South Amboy	1,505	4,277	1/13	0/13	Yes	No
Sayreville-Melrose	102	185	1/2	0/8	No	No
Middlesex County Sewerage Authority	171,425	838,222	2/14	0/14	Yes	Yes
Camp Kilmer	NA	NA	-	-	-	-
Raritan Arsenal	NA	NA	-	-	-	-
Woodbridge-Keasby	NA	NA	-	-	-	-
Perth Amboy	14,949	34,469	4/14	3/14	Yes	Yes
Woodbridge-Sewaren	3,573	5,122	0/12	-	No	No
Carteret	9,111	12,715	1/13	-	No	No
Rahway Valley	51,102	117,332	0/6	-	No	No
Linden-Roselle	44,762	176,305	0/12	-	Yes	Yes
Elizabeth Joint Meeting	145,027	328,870	0/11	-	Yes	No
New York						
Willowbrook Hospital	1,903	9,854	0/12	-	No	Yes
Tottenville	4,000	4,000	-	-	-	-
Mount Loretto Home	No Samples	Taken	-	6/6	No	Yes
Richmond Memorial Hospital	No Samples	Taken	-	5/5	No	Yes
S.S. White Dental Co.	NA	NA	-	-	-	-
St. Joseph's Home	No Samples	Taken	-	1/1	No	No
Oakwood Beach	11,019	9,949	2/14	2/14	No	No

* During summer months

NA-No data available


WASTES SOURCES
Raritan Bay and Arthur Kill
N
BROOKLYN
STATEN ISLAND
NEW JERSEY
NEW YORK
NEW JERSEY
NEW JERSEY
SANDY HOOK
Municipal Untreated
Municipal Treated
Industrial
Data: ISC

Government Exhibit 6

UNTREATED SEWAGE

Raw sewage is discharged to Raritan Bay from two areas. Tottenville, New York, on the southwestern tip of Staten Island, discharges raw sewage from an estimated population of 4,000. The pier facilities of the U. S. Naval Ammunition Depot at Leonardo, New Jersey, are equipped with privies installed directly over the water and discharge wastes from a population of 100 to 250 persons. The S. S. White Dental Company on Staten Island discharges the sewage from 700 persons with only chlorination by HTH.

Incomplete records indicate that at least seven of the sewerage systems providing treatment have by-pass or overflow devices which permit raw sewage to discharge directly to the receiving waters on occasions.

Would you point those out, Mr. De Falco?

MR. DE FALCO: Keansburg, Keyport, Perth Amboy, Linden-Roselle, South Amboy, Middlesex County Sewerage Authority, and Elizabeth Joint Meeting.

MR. CLARK: Thank you.

Several of the systems have combined sewers. The by-passing of raw sewage discharges usually occurs during periods of rainfall when excessive quantities of water enter the sewers. No estimate of the pollution potential of this overflow is available.

Many commercial ships and pleasure boats discharge untreated sewage during their passage through these waters. No records are available, but a conservative estimate indicates that such discharges may be equivalent to the sewage from at least 1,000 persons daily.

TREATED SEWAGE

Most of the sewage discharged to the water area under consideration receives some treatment. The six treatment plants discharging to the Class B waters of Arthur Kill serve 803,000 persons or 63 percent of the total sewered population, generally with primary treatment only.

Would you point those out, Mr. De Falco?

MR. DE FALCO: Woodbridge, Carteret, Rahway Valley, Linden-Roselle, Elizabeth Joint Meeting and Willowbrook.

MR. CLARK: Thank you.

A few of the plants have chlorination equipment on a stand-by basis, but are not required to operate it. The other treatment plants, discharging to the tidal portion of Raritan River and to the Bay area generally provide the equivalent of primary treatment and chlorination.

Would you point those out, Mr. De Falco?

MR. DE FALCO: It is the area generally surrounding that.

MR. CLARK: Thank you.

Five small septic tank plants, serving a total of 2,000 persons, do not have chlorination equipment. At three of them, chlorination with HTH is attempted. It has been my experience that disinfection by this method has usually given poor results in many locations, or it is done by the batch methods in other locations. All of these plants are on Staten Island east of Tottenville.

MR. STEIN: Where are those septic tanks? In New York?

MR. CLARK: Yes. Will you please point out those places? The septic tanks are located in Staten Island, New York. All of those plants are located on Staten Island east of Tottenville.

I submit Government's Exhibits 7 and 8.

(The map referred to, entitled "Suspended Solids Loadings, Population Equivalents," was marked for identification Government's Exhibit No. 7.)

(The map referred to, entitled "BOD Loadings, Population Equivalents," was marked for identification Government's Exhibit No. 8.)

A VOICE: Mr. Chairman, will you check that statement again? He mentioned Oakwood Beach as being primary. Oakwood Beach is secondary.

MR. STEIN: Is that correct? It is, I understand, an intermediary treatment. Is that secondary? It is a secondary treatment.

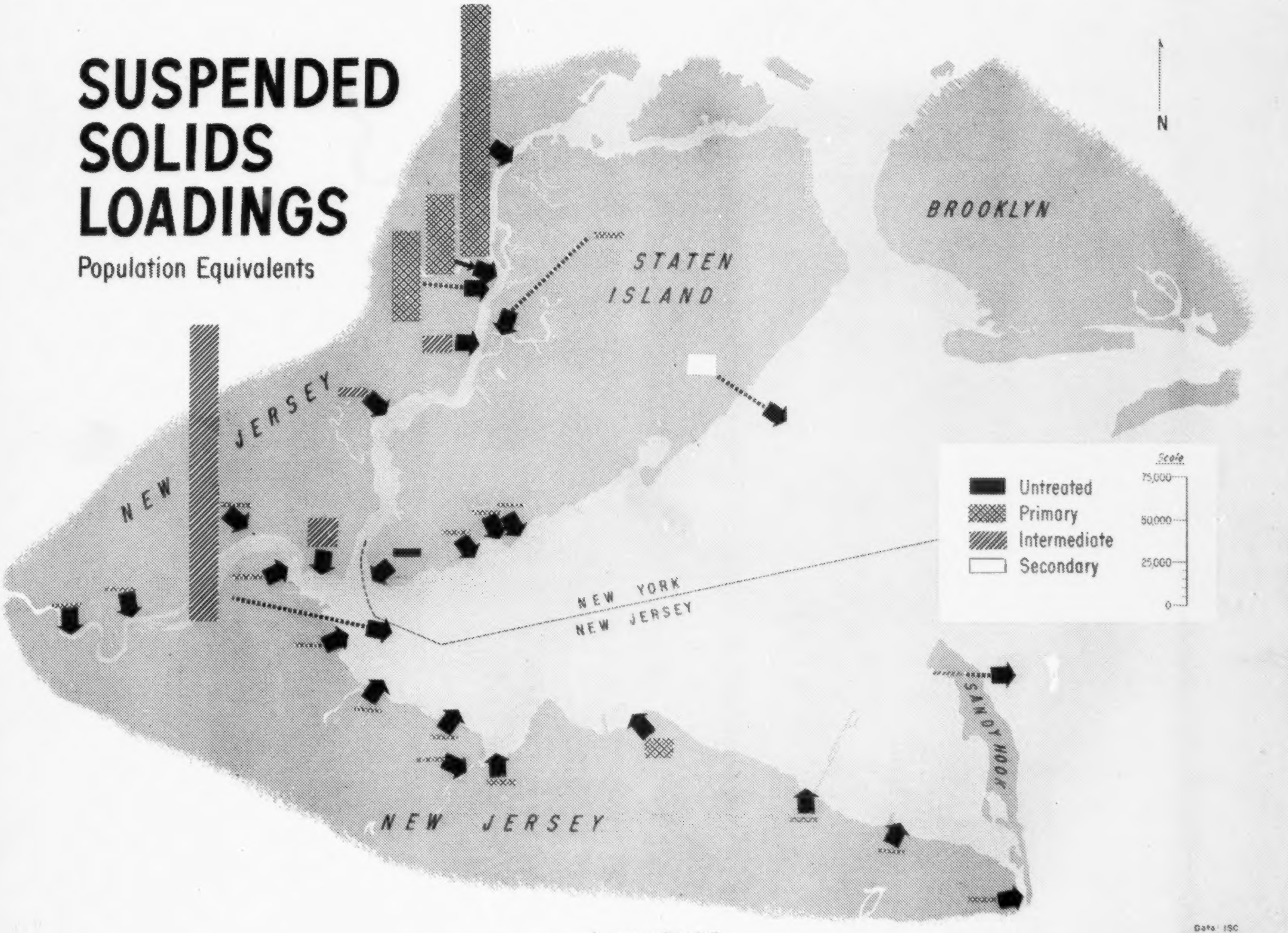
MR. DE FALCO: It is marked accordingly on the table.

A VOICE: If you are going to make corrections I think you should make corrections that the county has a storm water overflow, because that is not correct.

MR. STEIN: I would appreciate it if you would correct it when your chance comes to make a statement. Otherwise we will have trouble getting through here. But you will be given a full opportunity to make a statement. While these are coming up, I think that the corrections which can be made are the ones which are obvious in the reading. Where someone has a secondary treatment on the chart and it is read as primary, I think those are easily made; but other types of corrections I think should await the statements made by the various participants.

SUSPENDED SOLIDS LOADINGS

Population Equivalents

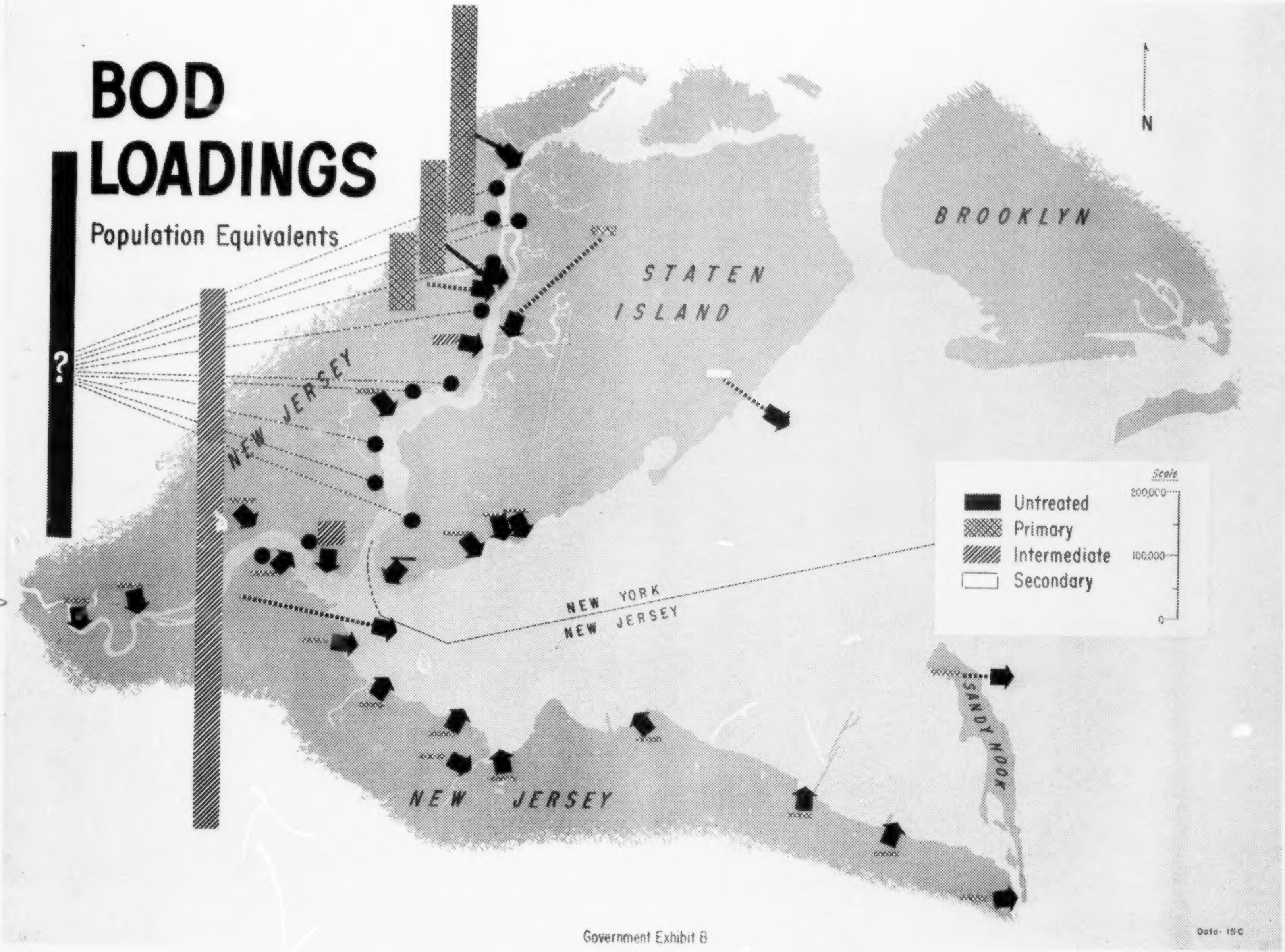

N
BROOKLYN
STATEN ISLAND
NEW JERSEY
NEW YORK
NEW JERSEY
SANDY HOOK
NEW JERSEY
Untreated
Primary
Intermediate
Secondary
Scale
75,000
50,000
25,000
0
Data: ISC

Government Exhibit 7

20-a

BOD LOADINGS

Population Equivalents



?
N
BROOKLYN
STATEN ISLAND
NEW JERSEY
NEW YORK
NEW JERSEY
NEW JERSEY
SANDY HOOK
Untreated
Primary
Intermediate
Secondary
Scale
200,000
100,000
0

Data- ISC

Government Exhibit 8

20-b

MR. CLARK: Government's Exhibits 7 and 8 indicate the quantities of suspended solids and biochemical oxygen demand discharged to the waters of the area, in the form of population equivalents.

On those bars they are in a logarithmic scale, so do not compare them.

MR. KLASHMAN: These are linear scales.

MR. CLARK: Oh, these are linear scales.

The bars permit ready identification of those areas where the major loads are discharged.

Government's Exhibit Table 5 and Government's Exhibit 7 indicate that the total suspended solids population equivalent from all sources of sewage is 473,000. Of this total, 456,000 population equivalent or 96 percent, originates from New Jersey, and 17,000 population or 4 percent originates from New York.

Table 5 and Government's Exhibit 8 indicate that the total biochemical oxygen demand population equivalent from all sources of sewage is 1,550,000 with about 1,500,000 or 98 percent originating from New Jersey, and 24,000 or 2 percent originating from New York. It is significant to note that the total 1,550,000 biochemical oxygen demand population equivalent of the wastes discharged from the sewerage systems is 20 percent greater than the total population of 1,280,000 served by the systems. This indicates that considerable quantities of industrial wastes are received by these sewerage systems.

RECORDS OF INSPECTION

Inspection of 17 of the 28 sewage treatment plants is made three to four times annually by the Interstate Sanitation Commission and the following discussion is based principally on the records made available by the Commission.

The records of inspection since 1958 have been reviewed. Performance of many of the plants have been checked between 11 and 15 times during this three-year period. Some of the smaller plants have been checked from one to five times. These records include checks for suspended solids removals on 17 plants, and for coliform bacteria on 15 plants. Effluents discharged in Class B waters are not checked for coliform densities by the Interstate Sanitation Commission.

Suspended solids removal efficiencies were examined 181 times with the plants failing to meet the required removals 47 times, or 26 percent of the times tested. The record shows no failures for 7 plants, 3 plants failed 9 to 11 times each, and five of the remaining seven plants failed to meet standards 50 percent or more of the time.

The coliform limit on the effluents was checked 139 times. There were 41 failures to meet this requirement, or 29 percent of the total checks made. Five plants had no failures at all. Two failed 9 times each out of 12 and 13 checks. Seven of the 8 remaining plants failed 50 percent of the time to meet the standards.

Ten of the plants are overloaded. Two of these are overloaded during the summer because of the large increases in populations during the vacation period. However, this is a problem common to many seashore towns.

The discharge of the Perth Amboy, New Jersey sewage treatment plant deserves special comment. This effluent discharges about 200 feet offshore at approximately the center of the bathing area of a Perth Amboy public bathing beach. The resulting boil is readily apparent from the beach. The coliform content of the effluent failed to meet the Interstate Sanitation Commission standard on three occasions during fifteen inspections. It failed to meet the suspended solids removal requirements on four occasions.

INDUSTRIAL WASTES

The detailed information available on sewerage systems is not matched by similarly detailed information on industrial wastes.

I submit Government's Exhibit Table 6.

(The document referred to, entitled "Table 6, Industries Discharging to Arthur Kill," was marked for identification as Government's Exhibit Table No. 6.)

MR. CLARK: The only information available for this report is a list of plants, Government's Exhibit Table 6, discharging wastes to the Arthur Kill, and an estimate that the combined wastes from all these plants discharging directly to the Kill has a biochemical oxygen demand of 100,000 pounds per day, or a population equivalent of about 600,000.

"TABLE 6

INDUSTRIES DISCHARGING TO ARTHUR KILL

New Jersey

"1. Phelps Dodge Copper Product Corporation
2. Archer Daniels Midland Company
3. Cities Service Oil Company
4. National Lead Company
5. Koppers Company, Inc., Wood Preserving Division
6. Vulcan Detinning Co., Div. of Vulcan Materials Co.
7. Westvaco Mineral Products Division of FMC
8. General American Tank Storage Terminals

TABLE 6

INDUSTRIES DISCHARGING TO ARTHUR KILL

New Jersey

1. Phelps Dodge Copper Product Corporation
2. Archer Daniels Midland Company
3. Cities Service Oil Company
4. National Lead Company
5. Koppers Company, Inc., Wood Preserving Division
6. Vulcan Detinning Co., Div. of Vulcan Materials Co.
7. Westvaco Mineral Products Division of FMC
8. General American Tank Storage Terminals
9. American Cyanamid
10. General Aniline & Film Corp.
11. E. I. duPont de Nemours & Company
12. Esso Bayway Refinery
13. California Oil Company

New York

1. Nassau Smelting and Refining Co., Inc.
2. Socony Mobil Oil Co., Inc.
3. Gulf Oil Corp.
4. Onyx Chemical Co.

"9. American Cyanamid
10. General Aniline & Film Corp.
11. E. I. duPont de Nemours & Company
12. Esso Bayway Refinery
13. California Oil Company

New York

1. Nassau Smelting and Refining Co. Inc.
2. Socony Mobil Oil Co., Inc.
3. Gulf Oil Corp.
4. Onyx Chemical Co."

The Interstate Sanitation Commission reported on Page 13 of their 1959 Annual Report that,

> "... the industrial wastes still discharging raw must receive attention. The Arthur Kill is such an area and has a larger concentration of industry than any other portion of our District..."
>
> "Since the majority of industry is on the New Jersey side of the Arthur Kill, the Commission has worked very closely with the New Jersey State Department of Health in the study of the problem. A joint meeting was held with the industries which contribute the greatest volume of untreated industrial wastes into the Arthur Kill and acquainted them with the problem. It was decided that other meetings should be held with each industry so that its individual problems could be discussed in more detail. A number of such meetings have already been held between representatives of industry and the control agencies. These meetings have indicated that the industries are aware of the magnitude of this problem and are anxious to cooperate in reducing the amount of pollution being discharged. After a complete picture is obtained, the Commission and the New Jersey State Department of Health will determine the action that will be required to correct this condition."

Additional information on waste treatment or other measures to reduce industrial wastes was not available from the various regulatory agencies at the time this report was prepared.

EFFECTS OF POLLUTION ON WATER QUALITY AND USES

Two principal indicators of water quality are used in this discussion of the effects of pollution. These are:

1. Densities of coliform bacteria, which indicate the fecal pollution and the potential of waterborne disease from sewage contamination; and,

2. concentrations of dissolved oxygen which reflect the effects of organic pollution by both sewage and industrial wastes, indicating the potential damage to or destruction of aquatic life, including fish.

STANDARDS OF WATER QUALITY

There are several water quality standards used by the various regulatory agencies for the waters under consideration.

In addition to its standards of effluent quality the Interstate Sanitation Commission requires that the dissolved oxygen of Class A waters shall not be less than 50 percent of saturation, and of Class B waters not less than 30 percent.

The New York City Department of Health approves as safe bathing waters those having an average coliform bacteria concentration not in excess of 1,000 per 100 milliliters. It classes as approved but subject to reclassification waters having average coliform concentrations between 1,000 and 2,400 per 100 milliliters. It recommends against bathing in waters having average coliform concentrations in excess of 2,400 for 100 milliliters.

New Jersey State Department of Health recommends for surf bathing waters that the content of coliform organisms is tentatively established as 2,400 per 100 milliliters as the maximum limit recognized as being satisfactory.

Both New York and New Jersey authorities adhere to the U. S. Public Health Service recommended standard for shellfish waters. This standard requires that the median coliform bacterial concentration shall not exceed 70 per 100 milliliters, and that not more than 10 percent of the values in a series of samples shall exceed 230 coliform bacteria per 100 milliliters.

No standard has been adopted for the waters used for boating in this area. Many State pollution control agencies recommend that the mean coliform concentration of such waters should not exceed 5,000 per 100 milliliters.

These various standards have been developed with a variety of different objectives. In the case of the Raritan Bay area, there is no assurance that, even if these standards were attained, all potential danger to health and welfare would be eliminated. Consideration must be given to the attainment of a water quality compatible with the existing and projected water uses of the area.

There is considerable data on coliform bacteria and dissolved oxygen concentrations on most of the waters involved. These data have been used to document the pollution in this area. Requirements for inclusion of these data were:

1. Sample collection and laboratory procedures used were considered acceptable;

2. numbers of samples from an individual location were sufficient to yield statistically significant data;

3. no indeterminate values were used; and,

4. the period covered by sample collection was recent enough to represent present conditions.

ARTHUR KILL

The Arthur Kill has been designated as Class A water, south of Outerbridge Crossing, and Class B water north of Outerbridge, by the Interstate Sanitation Commission. The Kill receives large quantities of both sewage containing fecal excreta and industrial wastes.

I would like to have Government's Exhibit 9 submitted at this point.

(The map referred to, entitled "Geometric Mean Coliform, Profile of Arthur Kill," was marked for identification as Government's Exhibit No. 9.)

MR. CLARK: The next subject is Coliform Bacteria.

COLIFORM BACTERIA

Geometric means of data on coliform bacteria procured at three stations on the Arthur Kill by the New York City Department of Public Works during 1958 to 1961 are presented in Government's Exhibit 9.

MR. STEIN: Just a moment. I would like to point out this fact: Does this chart have those logarithmic scales? I know this always confuses me and for the people in the audience I would like you to note that each one of these are ten times the other. In other words, this is 1,000 and this is 10,000 and this is 100,000. The reason why they do this is that the lines won't shoot up off the paper. You have to visualize then that small differences here, if they were to follow the scale at the bottom, would be tremendous, and the differences that are visual to the eye appear very tiny as you go toward the top of the scale, but they are very, very large differences indeed.

MR. CLARK: This exhibit would be much more striking if it were plotted against a linear scale.

The three stations are about equally spaced along the length of the Kill, with Station K3 near the northern end, K4 about midway, and K5 near the southern end, which have been pointed out by Mr. De Falco.

The mean values at K3 and K4 indicate gross bacterial contamination of the Kill north of Outerbridge. The lowest mean annual density of coliform bacteria at the two stations was 13,500 per 100 milliliters at K4 in 1959 with the other mean values between 47,000 and 110,000 per 100 milliliters. These data show that contamination was greater at the northern end of the Kill than at midpoint. That is true, although the logarithmic scales do not show it as strikingly as they should.

The coliforms at the southern end of the Kill were lower with annual means at Station K5 ranging from 1,800 to 6,400 per 100 milliliters. Station K5, at the confluence of Arthur Kill and Raritan Bay, if you will point that out, is subject to greater dilution through tidal exchange.

Any uses of the Arthur Kill and its tidal tributaries which might result in the ingestion of even small quantities of this highly contaminated water involve a potential hazard of contracting a water-borne disease.

DISSOLVED OXYGEN

Data obtained by the Interstate Sanitation Commission in 1957 on dissolved oxygen in Arthur Kill at 18 stations are presented in Government's Exhibit 10. I would like to submit Government's Exhibit 10.

(The map referred to, entitled "Weighted Mean % Saturation of Dissolved Oxygen, 1957 Arthur Kill Survey," was marked for identification Government's Exhibit No. 10.)

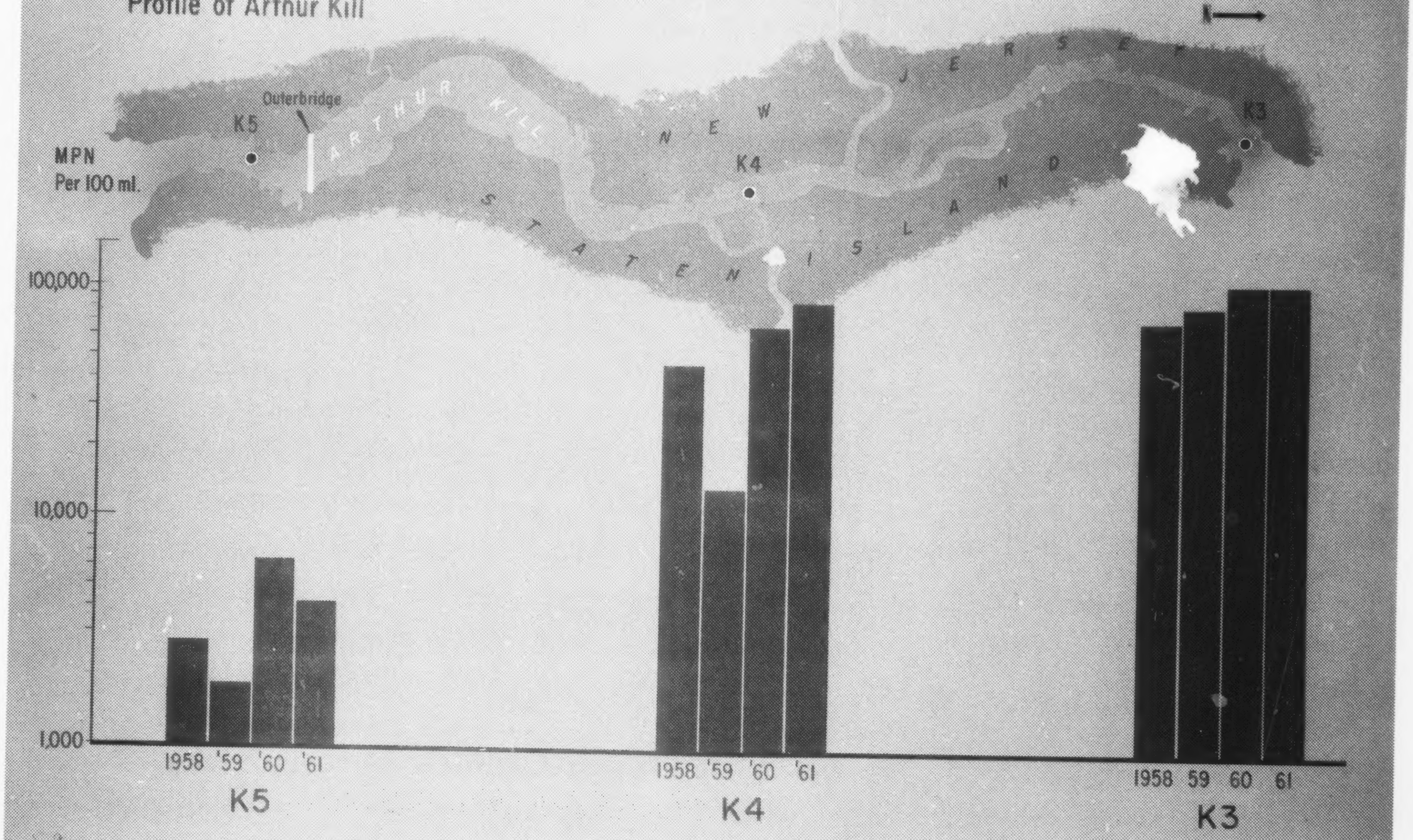
MR. CLARK: A representative of the Interstate Sanitation Commission informed a Public Health Service investigator that the present conditions were essentially the same as indicated by the 1957 data supplied by the Interstate Sanitation Commission.

At ten of the sixteen stations above Outerbridge, representing 6.4 miles of the Kill, the dissolved oxygen was less than the Commission's standard. The dissolved oxygen saturation at Station 7, near Tremley Point, was about 7 percent representing the low point in the Kill. At the northern end of the Kill, the dissolved oxygen saturation was just above 30 percent. In the lower portion of the Kill the dissolved oxygen rose to above 50 percent saturation in the vicinity of Outerbridge Crossing, and to about 65 percent at Station 18 near the southern end of the Kill.

The very low dissolved oxygen at Station 7 approached the condition of total oxygen depletion which creates odor nuisances. The dissolved oxygen for some distance in both directions from this station was low enough to be deleterious to aquatic life, including fish.

GEOMETRIC MEAN COLIFORM

Profile of Arthur Kill

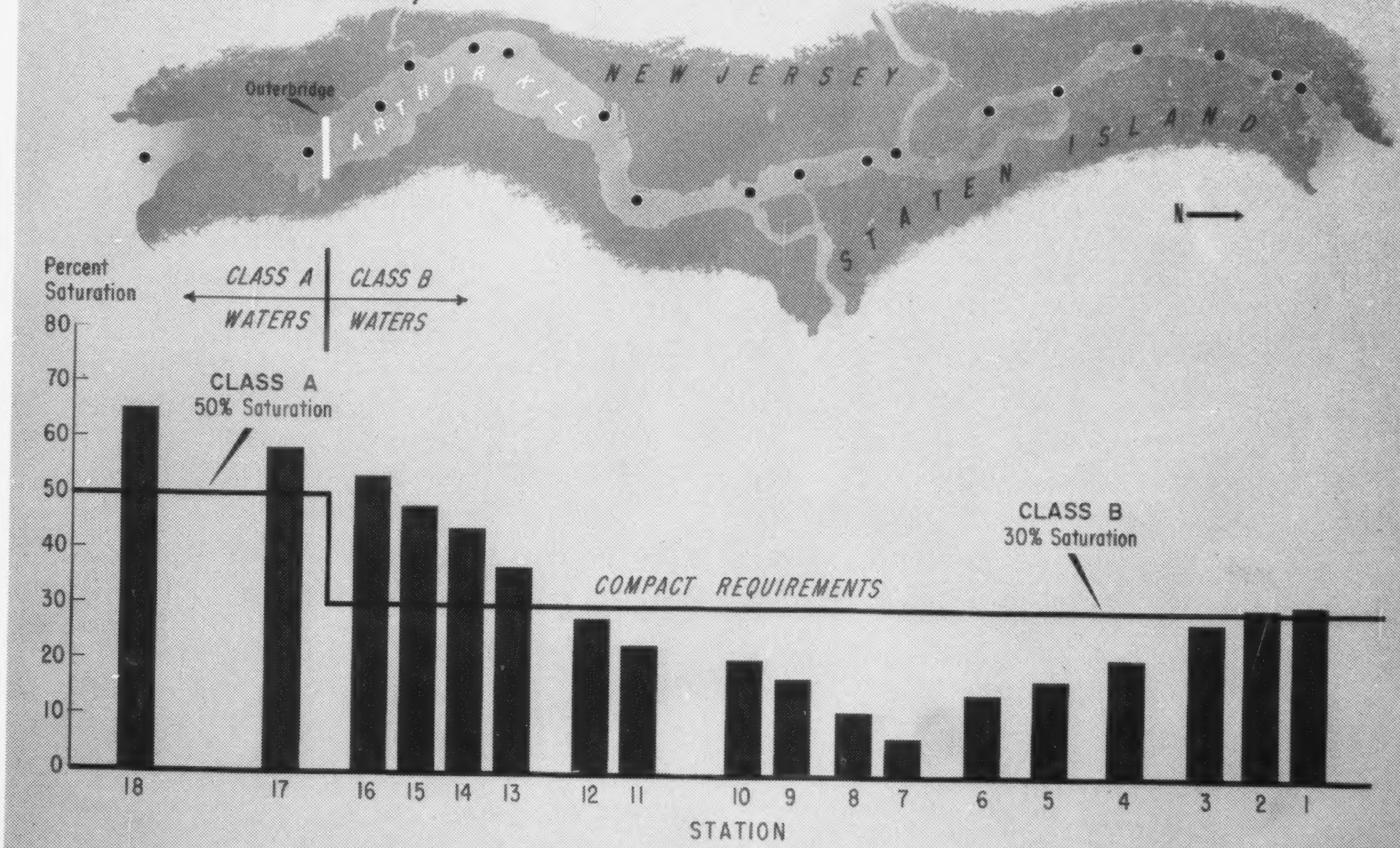


Government Exhibit 9

Data: NYCDPW

WEIGHTED MEAN % SATURATION OF DISSOLVED OXYGEN

1957 Arthur Kill Survey



Government Exhibit 10

Data: ISC Annual Report 1958

THE NARROWS

The ebb and flow of the tides cause water in the Narrows to fluctuate back and forth, with the over-all preponderance of movement outward toward the Lower Bay and the Atlantic Ocean. The quality of the water in the Narrows is influenced by wastes discharged either north or south of the Narrows. Undoubtedly, the major influence on water quality in this area is exerted by treated and untreated wastes discharged by 10 million people to Upper Harbor, north of the Narrows.

Coliform Bacteria

The New York City Department of Public Works annually collects samples over a tidal cycle in the Narrows. Samples are collected at both top and bottom from three points across the Narrows. Geometric means of the MPN data for 1959 through 1961 are given in Table 7.

I submit Government's Table 7 as an exhibit.

(The document referred to, entitled "Table 7, Coliform Density Per 100 ML. Geometric Means for A Tidal Cycle at The Narrows" was marked for identification Government's Exhibit Table No. 7.)

MR. CLARK: The range of the means was 11,000 to 64,000 per 100 milliliters with one additional value of 5,300.

Will you point that out -- the 5,300?

In general the higher means occurred at the surface of the three sampling points and of the total of eighteen means involved, twelve were in excess of 20,000 per 100 milliliters. Thus, the waters flowing through the Narrows generally carried coliform bacteria in excess of 20,000 per 100 milliliters with half of the means in excess of 30,000 coliforms per 100 milliliters.

Dissolved Oxygen

A 1959 report of The Interstate Sanitation Commission indicates that the weighted mean dissolved oxygen saturation of the water at the Narrows was 52 percent.

TIDAL PORTION OF RARITAN RIVER

Previous to 1958 much of the sewage and industrial wastes from Middlesex County, New Jersey, was discharged into the Raritan River. In 1957, the Middlesex County Sewerage Authority completed a sewage treatment plant with an outfall discharging into Raritan Bay south of Tottenville, New York. In March, 1960, M. C. Rand and E. R. Segesser, Chief Chemist, Middlesex County Sewage Authority, and Principal Engineer, New Jersey State Health Department, respectively, made a study of the river to determine what improvement had been achieved.

Coliform Bacteria

They reported coliform data for dry weather periods only in Raritan Bay at the junction of Raritan Bay and the Arthur Kill. The geometric means were 1,400 per 100 milliliters for 1958, and 1,800 per 100 milliliters for 1959, and with 10 percent of the values in excess of 10,000 per 100 milliliters.[4]

Dissolved Oxygen

They reported further that during 1958 the dissolved oxygen saturation of the Raritan River at Victory Bridge, one-half mile above Raritan Bay, was 62 percent. This represented a marked improvement over the 2 percent dissolved oxygen saturation found at this point in 1957, prior to completion of the new sewage treatment plant.[4]

THE BAY AREA

The waters of the Bay area have been designated as Class A waters by The Interstate Sanitation Commission. The City Health Department of New York and the State Health Department of New Jersey have responsibilities for surveillance of water quality of their respective bathing beaches surrounding the Bay.

The New Jersey State Health Department and the New York State Conservation Department are responsible for the surveillance of these waters in regard to their use as a shellfish production and harvesting area.

The data available on water quality indicate that pollution reaches the Bay from three principal sources. These are the communities which discharge wastes directly to the Bay, the outflow from Arthur Kill, and that portion of the flow through the Narrows which enters the Bay.

Coliform Bacteria

All data on coliform bacteria yield the same general pattern of bacterial contamination of the Bay area. This pattern reveals high levels of contamination at both the northeastern and western ends of the Bay, with lower densities in the middle and southeastern portions of the Bay area.

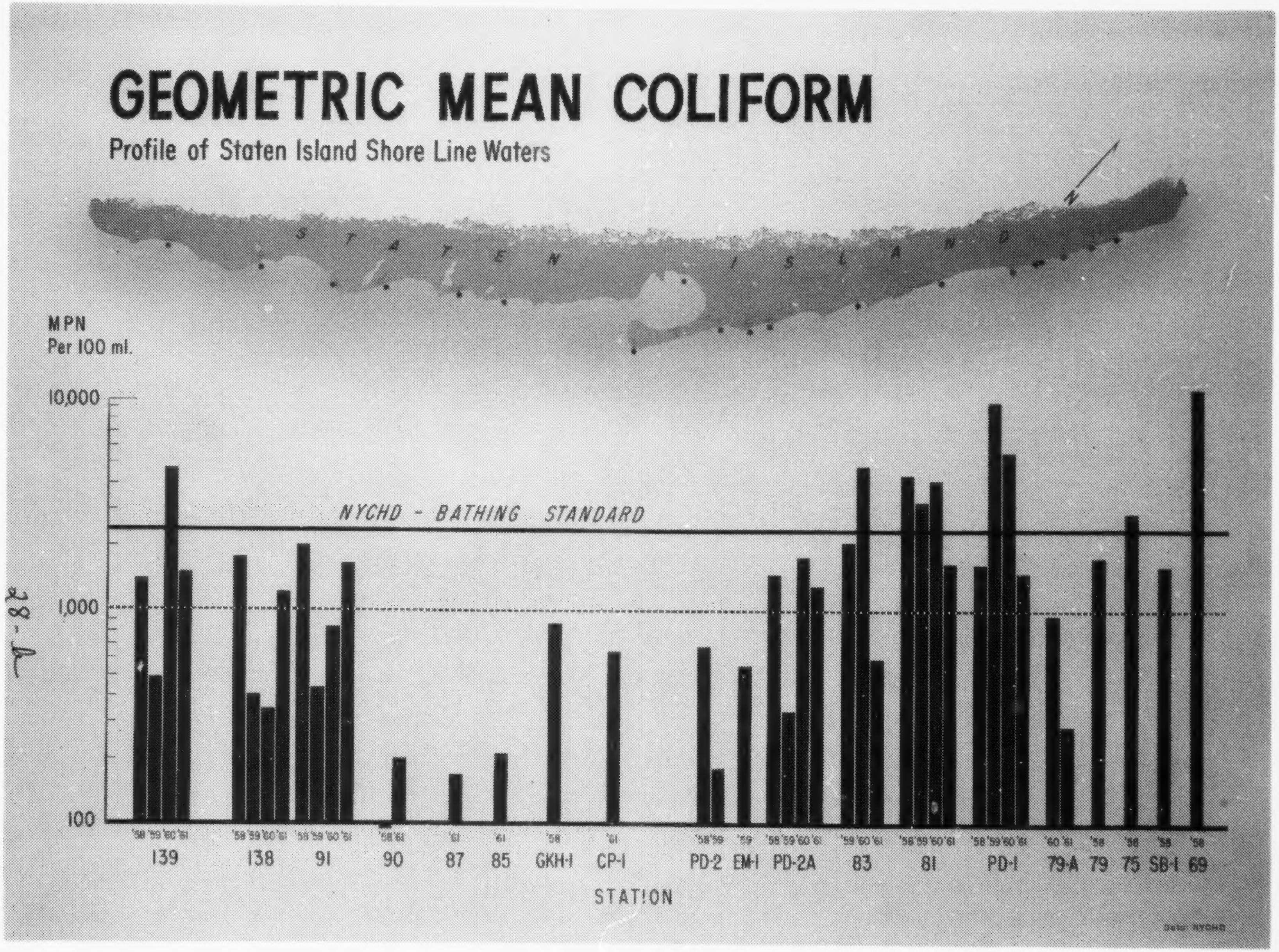
Geometric annual means of coliform data collected between 1958 and 1961 by the New York City Health Department along the bathing beaches of southeastern Staten Island are shown in Government's Exhibit 11, which I would like to present at this time.

(The document referred to, entitled "Geometric Mean Coliform, Profile of Staten Island Shore Line Waters," was marked for identification Government's Exhibit No. 11.)

TABLE 7

COLIFORM DENSITY PER 100 ML.
GEOMETRIC MEANS FOR A TIDAL CYCLE
AT THE NARROWS

Year		N8 West	N8	N8 East
1959	Top	15,000	14,000	26,000
	Bottom	12,000	11,000	5,300
1960	Top	55,000	33,000	15,000
	Bottom	34,000	64,000	32,000
1961	Top	34,000	30,000	37,000
	Bottom	27,000	24,000	34,000


GEOMETRIC MEAN COLIFORM

Profile of Staten Island Shore Line Waters

Data: NYCHD

28-b

Government Exhibit 11

MR. STEIN: Is this a logarithmic scale again?

MR. CLARK: I would like the record to show it is. It has a dotted line across at the 1,000 level and a heavy line across at the 2,400 level.

On Government's Exhibit 11 at three stations between Tottenville and Seguine Point seven of the twelve annual means exceeded 1,000 coliforms per 100 milliliters. The highest of the four annual means at Tottenville was 4,700 per 100 milliliters, or twice the standard, in 1960, and near Seguine Point the highest was 2,100 per 100 milliliters in 1961. The high value at Tottenville exceeds the maximum of 2,400 per 100 milliliters considered acceptable for bathing waters by the New York City Health Department, and the other six values in excess of 1,000 place all of the waters in this reach in the group subject to reclassification. Data for six of the seven stations in the reach between Seguine Point and the eastern end of Great Kills Park were limited to data for single years. A maximum value of 860 per 100 milliliters was reported at CP-1 at Great Kills Park in 1961. For the reach between Great Kills Park and the Narrows, there are 21 annual means for the nine sampling stations. Nineteen of these twenty-one annual means exceeded 1,000 per 100 milliliters, and ten exceeded 2,400 per 100 milliliters. The general trend along this reach is upward from Great Kills Park to the Narrows, with an annual mean of 11,500 per 100 milliliters below the Narrows, five times the standard, at the upper end of South Beach. Thus, most of the Staten Island shore line has waters of questionable to hazardous bacterial quality for bathing.

The Commanding Officer of Fort Wadsworth in complying with Army directives found that the quality of the waters along all of the beaches on Staten Island did not meet the bathing standards acceptable to the U. S. Army. Accordingly, he placed certain areas off limits.

I would like to submit Government's Exhibits 19 and 20 at this time.

(The document referred to, entitled "Headquarters Fort Wadsworth," dated 23 June 1961, was marked for identification Government's Exhibit No. 19.)

(The document referred to, entitled "Status of Swimming Areas on Staten Island, 1961," was marked for identification as Government's Exhibit No. 20.)

MR. CLARK: In addition, he has advised his command that other beaches were unsatisfactory by United States Army standards. They are detailed in Government's Exhibits 19 and 20, which are shown here.

Comparable data for the evaluation of the New Jersey beaches were not available.

A profile of annual geometric means along the New York-New Jersey

Ship Channel is presented in Government's Exhibit 12, which I would like to submit at this time.

(The map referred to, entitled "Geometric Mean Coliform, Profile Along New York-New Jersey Channel," was marked for identification as Government's Exhibit No. 12.)

MR. CLARK: Also one along the New York-New Jersey State line is shown in Government's Exhibit 13. Would you submit Government's Exhibit 13, please?

(The map referred to, entitled "Geometric Mean Coliform, Profile Along New York-New Jersey State Line," was marked for identification as Government's Exhibit No. 13.)

MR. CLARK: Both of these profiles exhibit trends similar to that of the Staten Island beach stations, with the higher values at the ends and the lower values near the middles. The three western stations of the Ship Channel profile have generally higher mean annual densities, in the range of 2,400 to 6,400 per 100 milliliters, than the comparable bathing beach stations. The remaining stations of this profile, on the other hand, have lower densities than the beach stations, ranging between 82 and 360 per 100 milliliters in the middle area, and between 300 and 790 at the eastern end. The State Line profile is somewhat similar to the Ship Channel profile, but with lower densities in the western end and middle area, but higher values for the eastern stations.

DR. KANDLE: Could we inquire as to the source of these data?

MR. STEIN: Yes. Do you have the source of these data?

MR. DE FALCO: They are all indicated on the chart.

MR. STEIN: Would you read it off the chart?

MR. DE FALCO: It is a composite of the values from the New York State Conservation Department, the New Jersey State Health Department, the New York City Health Department, and the New York City Department of Public Works.

MR. STEIN: And the other chart is the same?

MR. DE FALCO: The data on this is New York State Conservation Department, New Jersey State Health Department, and New York City Health Department.

MR. STEIN: The second chart you are pointing to is the chart called --

HEADQUARTERS FORT WADSWORTH
Staten Island 5, New York

23 June 1961

SUBJECT: Off Limits Swimming Areas

TO: President
Armed Forces Disciplinary Control Board
Governors Island
New York 4, New York

1. Reference Circular 385-6, Headquarters First United States Army, 19 May 1961, Subject:"Operation of Swimming Pools and Natural Bathing and Bathing Areas".

2. In compliance with paragraph 2, referenced Circular, attached is a sketch of off-limits swimming areas on this installation, Miller Army Airfield and surrounding areas. Also included on the sketch are swimming areas which have been approved by local health authorities.

3. Because of the great variance in bacteriological standards for salt water swimming areas, acceptable to local health authorities and the Army Medical Service, all personnel assigned, attached, or living on this installation have been urged through Post published media, to refrain from swimming at all beaches on Staten Island even though rated Class A by local authorities.

4. The following indicates the variance of acceptable standards mentioned in paragraph 3 above:

LOCALLY ACCEPTABLE

Class	Average MPN/100cc
A 1	0 - 1000
A 2	1000 - 2400
Over 2400 - Unsatisfactory	

ARMY ACCEPTABLE

Class	Average MPN/100cc
A	0 - 23
B	24 - 240
Over 240-Unsatisfactory	

FOR THE COMMANDER:

1 Incl

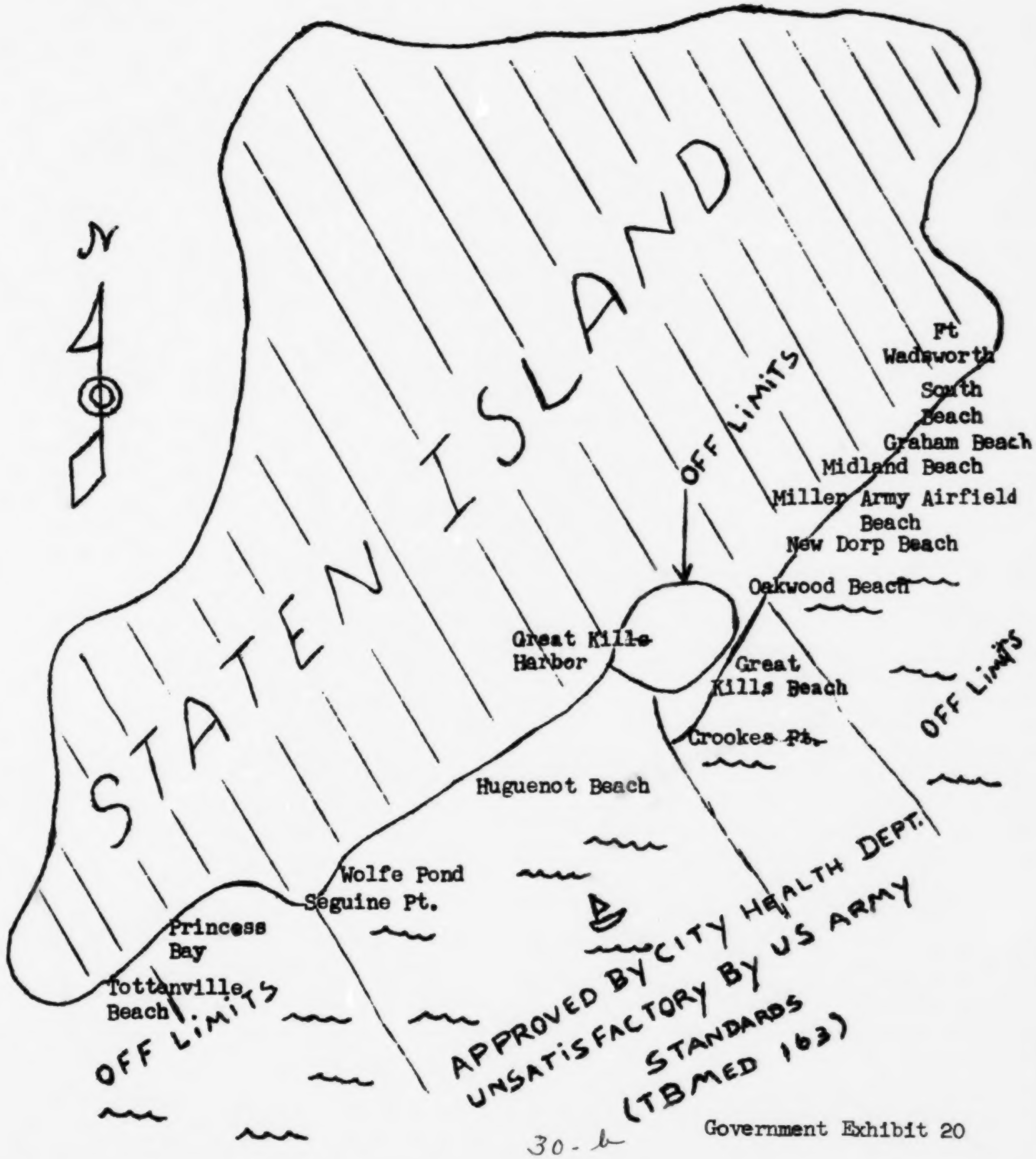
DANIEL A. VENOR
Capt, AGC
Adjutant

THIS IS A TRUE COPY

Government Exhibit 19

30-a

STATUS of SWIMMING AREAS ON STATEN ISLAND 1961

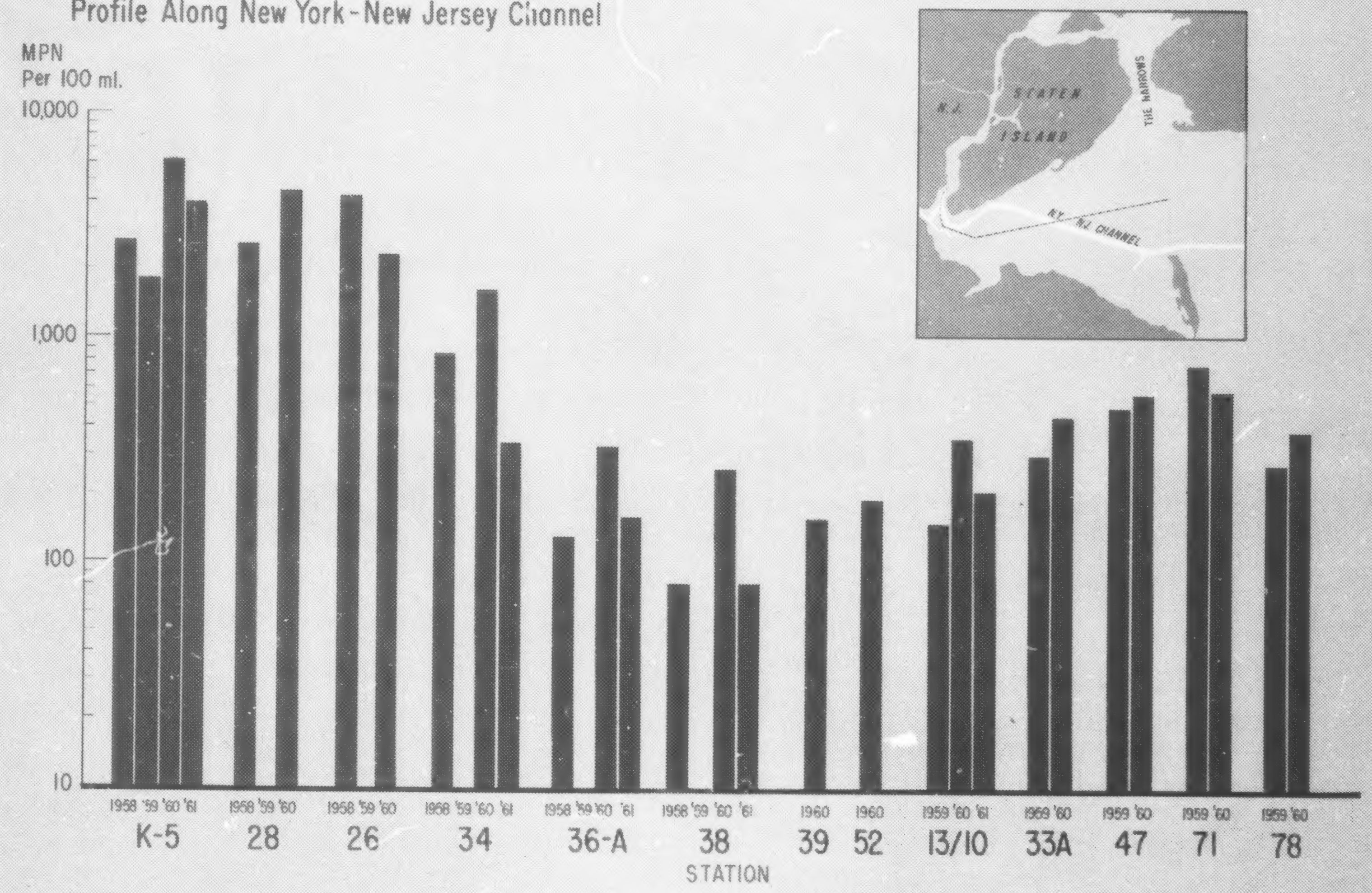

N
STATEN ISLAND
OFF LIMITS
Pt Wadsworth
South Beach
Graham Beach
Midland Beach
Miller Army Airfield Beach
New Dorp Beach
Oakwood Beach
Great Kills Harbor
Great Kills Beach
OFF LIMITS
Crookes Pt.
Huguenot Beach
Wolfe Pond
Seguine Pt.
Princess Bay
Tottenville Beach
OFF LIMITS
APPROVED BY CITY HEALTH DEPT.
UNSATISFACTORY BY US ARMY STANDARDS (TBMED 163)

30-b

Government Exhibit 20

GEOMETRIC MEAN COLIFORM

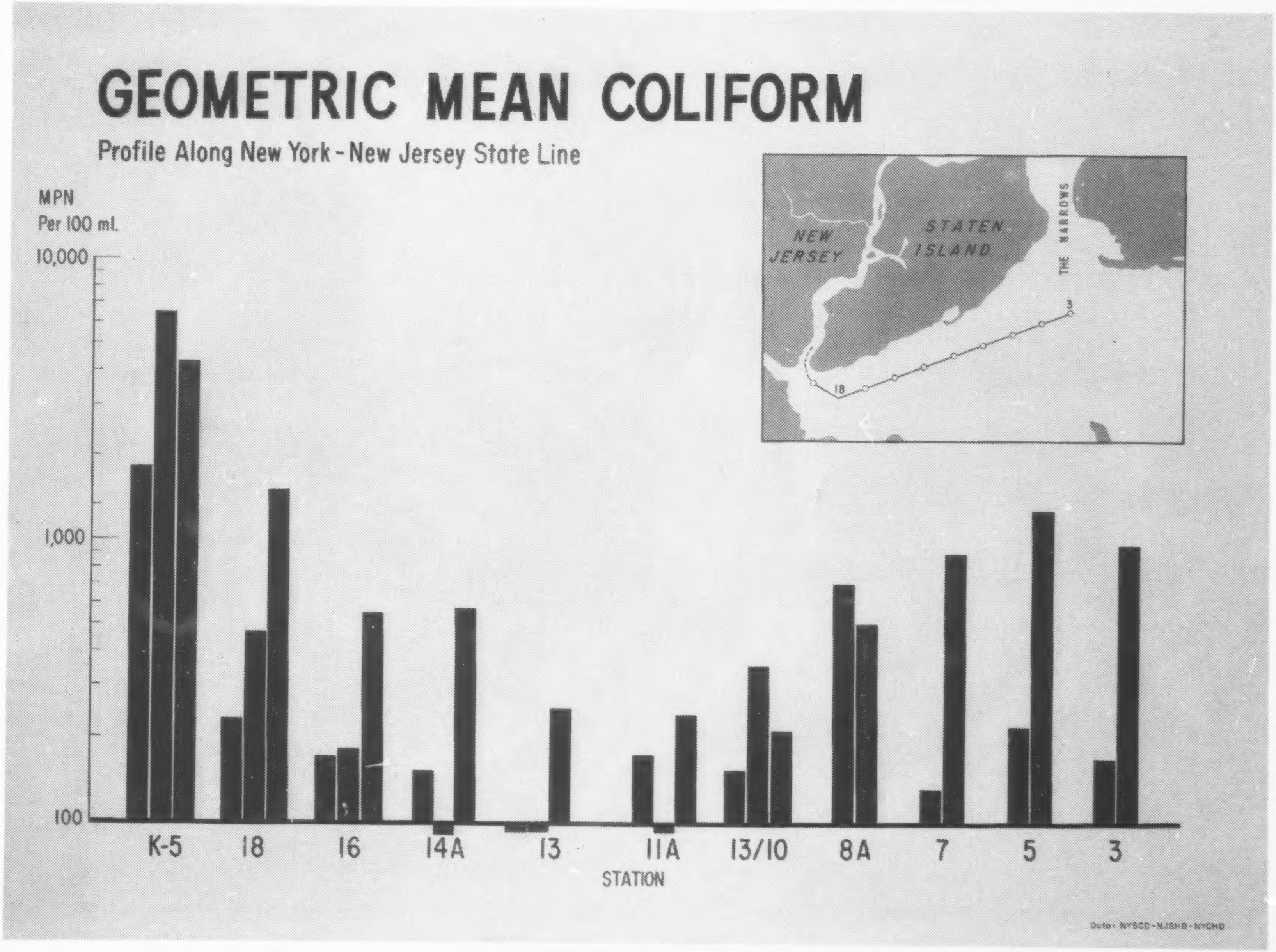
Profile Along New York - New Jersey Channel



Data NYSDH · NJSHD · NYCHD · NYCDPW

Government Exhibit 12

30-d



GEOMETRIC MEAN COLIFORM

Profile Along New York - New Jersey State Line

Data: NYSCD-NJSHD-NYCHD

Government Exhibit 13

30-d

MR. DE FALCO: This is No. 12 and this is No. 13.

MR. STEIN: They are No. 12 and No. 13.

MR. CLARK: The eastern stations of both profiles generally indicate a trend of increasing densities from 1959 to 1961. While the geometric mean values used for these profiles are not exactly comparable to the median values used as a basis for evaluating water quality over the shellfish beds, it is obvious from these data that much of the water of the Bay area would have median coliform values well in excess of the 70 per 100 milliliters which is the recommended standard for shellfish areas.

Data from two sampling stations are evaluated to illustrate the water quality over the shellfish beds at these points. These represent data from the same sample points collected over a four-year period.

I would like to enter Government's Exhibit 14 at this time.

(Chart entitled "Median Coliforms in Waters Overlying Shellfish Beds" was marked for identification as Government's Exhibit No. 14.)

DR. KANDLE: Is this the New York State report -- the New York State Conservation report?

MR. DE FALCO: No. This is New York City Health Department.

DR. KANDLE: So it is only New York waters.

MR. DE FALCO: Yes, sir.

MR. CLARK: Six to twelve top and bottom samples have been taken over a tidal cycle on thirteen occasions. These points were sampled during the months of April through October, for the years 1958, 1960 and 1961. The median coliform densities of these samples for each sampling period at Stations A and B are given in Government's Exhibit 14. At Station A the medians on eleven of the thirteen sampling dates exceeded the permissible limit of 70 per 100 milliliters for both top and bottom samples. At Station B, ten of the thirteen top sample medians exceeded the permissible limit, and twelve of the bottom sample medians exceeded the limit. At Station A on six of the thirteen days more than 10 percent of the bottom samples exceeded the permissible 230 per 100 milliliters limit. For the top samples at this station and for both top and bottom samples at Station B more than 10 percent exceeded 230 per 100 milliliters on nine of thirteen sampling days. At both stations there were days on which all samples from both top and bottom exceeded 230 per 100 milliliters.

These data are supported by the evidence of the previously discussed coliform profiles throughout the Bay. Bacterial contamination of much of the water of the Bay area presents the hazard of contracting disease to those who eat clams taken from the contaminated areas.

DR. KANDLE: Are we to presume that these Stations A and B are some areas which were then currently approved for the taking of shellfish?

MR. STEIN: Is the answer to that yes?

MR. CLARK: Yes.

DR. KANDLE: Could we have entered into the record where these stations are, and could we note for the record that these data do not appear to have come from the regulatory agencies which are responsible for the taking of shellfish?

MR. DE FALCO: Do you want me to detail it on the map?

MR. STEIN: Yes.

MR. DE FALCO: These come from areas located approximately in here.

DR. KANDLE: They are not an approved area at all and are not even near it.

MR. DE FALCO: Then let me give you the one on the shellfish. One in here and one in here.

DR. KANDLE: All right.

MR. STEIN: Would you want to indicate it orally? I don't think the record would show where you are pointing to, Mr. De Falco. Could you generally indicate, that is, in the Raritan Bay north of the State line dividing New York and New Jersey in New York waters.

MR. DE FALCO: Right. It about divides the area into roughly thirds on a central line running east-west through the shellfish area in New York Bay. Does that answer your question?

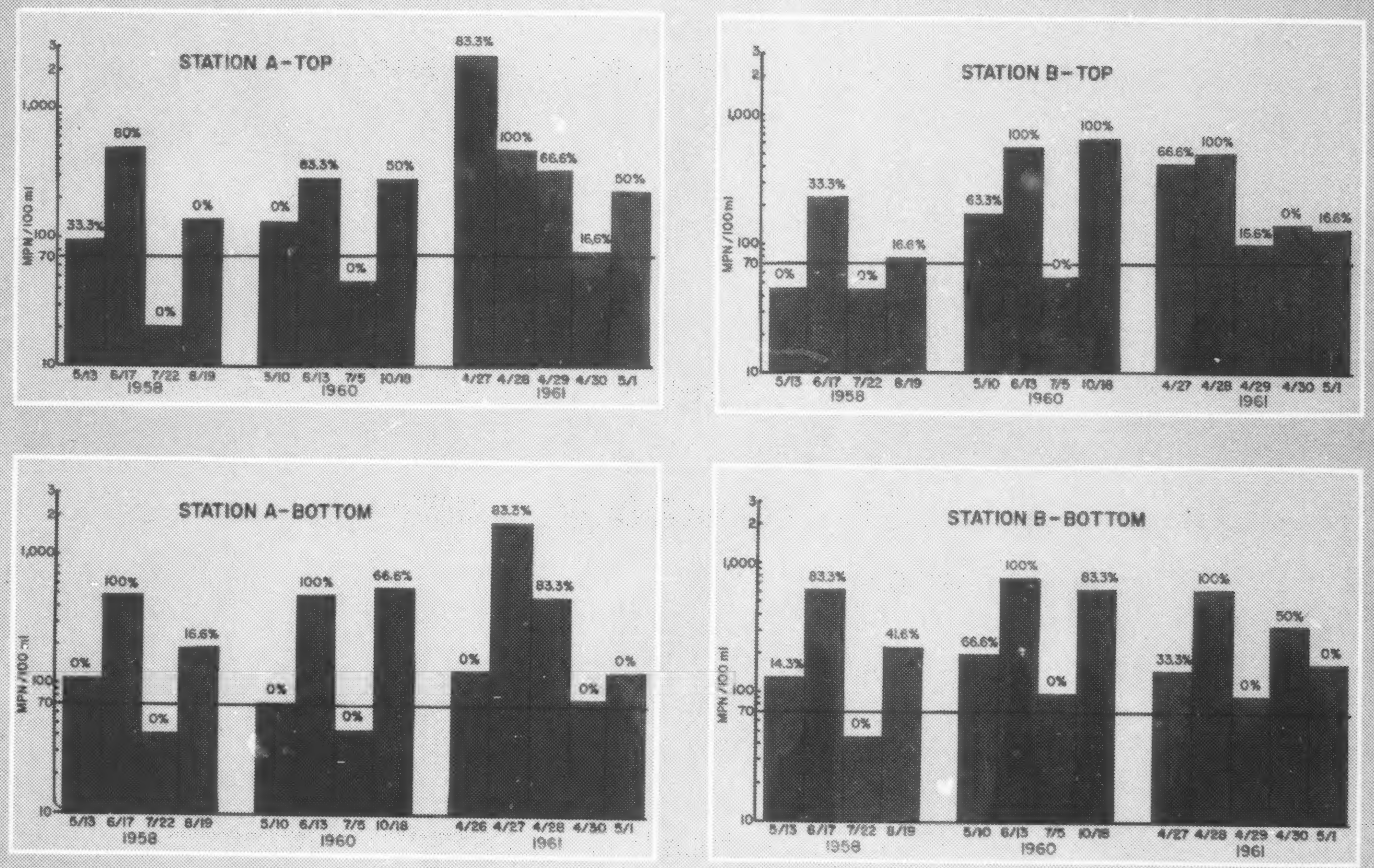
MR. STEIN: Does that answer your question?

DR. KANDLE: Yes.

MR. STEIN: I think I should make one remark here. I think that we should indicate these did not come from the regulatory agencies themselves. However, what we are measuring here are physical conditions. The record should also show that presumably the traditional standard methods are used to measure these physical conditions.

MR. CLARK: They were made by standard methods.

MEDIAN COLIFORMS IN WATERS OVERLYING SHELLFISH BEDS



3474-NYCID

Government Exhibit 14

MR. STEIN: Right.

MR. CLARK: And they did not come from regulatory agencies.

MR. STEIN: Right.

MR. CLARK: A large amount of MPN data has been collected during the past four years by the five agencies that are principally responsible for investigating the water quality of the Bay area. From these data a single geometric mean for each sampling station where data were adequate has been developed.

I would like to enter Government's Exhibit 15.

(The map referred to, entitled "Geometric Mean Coliform Per 100 ml, 1958-1961," was marked for identification as Government's Exhibit No. 15.)

MR. CLARK: Based on these means Government Exhibit 15 presents lines of equal coliform density throughout the Bay area. The density lines for the eastern end of the area illustrate clearly the increase of the contamination from the Narrows into Lower Bay. Starting with coliform densities greater than 20,000 per 100 milliliters at the Narrows there was a continuing decrease in density in a southwesterly direction along the Staten Island shore to 200 per 100 milliliters in the vicinity of Great Kills Park. There was a similar decrease from the Narrows in a southerly direction to 200 per 100 milliliters near the tip of Sandy Hook. The 200 density line was not straight across between Sandy Hook and Great Kills Park, but swung in an arc starting in a westerly direction from Sandy Hook and turning toward the north as it approached Great Kills Park.

The density lines for the western end of the Bay area showed high coliform densities in the vicinity of the mouth of the Raritan River, the southern end of Arthur Kill, and the area of the Middlesex County Sewerage Authority treatment plant outfall. In the Raritan River the coliform density decreased downstream from 4,000 per 100 milliliters near Sandy Point to 2,000 per 100 milliliters near Ferry Point. The density near the southern end of Arthur Kill also was 2,000 per 100 milliliters. As the waters from these two tributaries entered Raritan Bay the density rose to 3,000 per 100 milliliters and continued to increase to more than 4,000 per 100 milliliters in an area in the vicinity of the Middlesex County outfall. In the immediate area of the outfall a peak of 10,000 was recorded.

DR. KANDLE: Could I make one point?

MR. STEIN: Yes, sir.

DR. KANDLE: I would like to say to Mr. Clark I think he puts inferences into these and I would appreciate it if we would note the inferences as contrasted with the facts. For example, he just said where the waters, where these two waters or where the two tributaries empty into the Bay, and I think we should merely deal with what the data are, because the inference as to where they come from is an entirely different matter and I should not like to have it presumed that that data indicates we are necessarily assuming that they are coming from the Raritan or the Arthur Kill. All we know is that the counts are whatever he says.

MR. STEIN: I think that point is well taken. As I looked at this I thought what he was doing was just naming a location to locate a place where the data is coming from and where it enters into the Bay. I don't draw any inference from that that it came from the Raritan or anywhere else. That is the point where the physical conditions show that. There may be another descriptive way of doing this. I think at all these points, and correct me if I am wrong on this, Mr. Clark, I think you refer to places just to locate the point where you describe the physical conditions. Is that correct?

MR. CLARK: Let the record show I am only describing these specifically to locate the area. I have drawn no inference in my own mind and didn't realize anybody else would, that these were forming places.

DR. KANDLE: Very good.

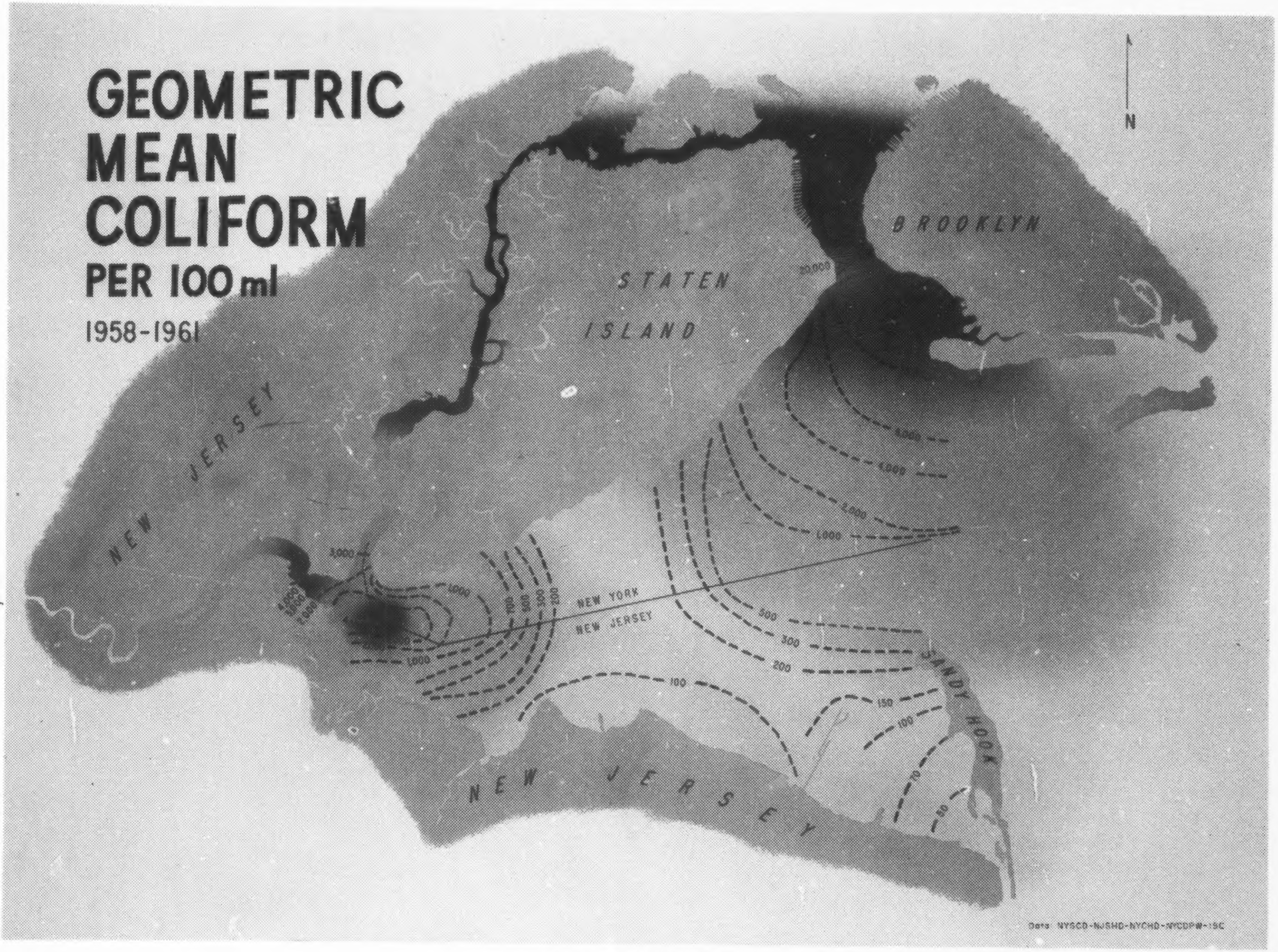
MR. CLARK: The point of specifically locating the coliform density at that point is the only thing I had in mind. It is difficult to describe the map in writing.

DR. KANDLE: Surely.

MR. CLARK: Generally, the density of the coliforms decrease as you move eastward to the center of the Bay. The New York-New Jersey State line in a general way bisects longitudinally the elliptical lines centering around the area of the Middlesex County outfall. Much of the central portion of the Bay had mean coliform densities less than 200 per 100 milliliters. The combined evidence of the coliform data indicate the health hazards involved in the use of the waters of portions of the Bay area.

The bacterial contamination of the waters of the western end of Raritan Bay and of the northeastern end of Lower Bay in the vicinity of the Staten Island shore presents a health hazard in the recreational use of these waters for boating, water skiing, fishing, etc.

Much of the waters of the Bay area are unsuitable for the taking of shellfish for human consumption. This is demonstrated by the closing of the Bay to shellfishing by the New York and New Jersey authorities on May 1, 1961. The health hazard involved in human consumption of raw clams taken from Raritan Bay was converted to a reality in early 1961 when a substantial number of cases of hepatitis resulted from eating raw clams taken from these waters.


GEOMETRIC
MEAN
COLIFORM
PER 100 ml
1958-1961
N
STATEN
ISLAND
BROOKLYN
NEW JERSEY
NEW JERSEY
SANDY HOOK
NEW YORK
NEW JERSEY
20,000
5,000
4,000
2,000
1,000
3,000
1000
700
500
300
200
1,000
500
300
200
100
150
100
70
50
Data: NYSCD-NJSHD-NYCHD-NYCDPW-ISC

Government Exhibit 15

Dissolved Oxygen

During the last half of May, 1960, the New York State Conservation Department collected samples for dissolved oxygen determinations along three profiles in the Bay area. One profile, involving five stations, extended in a southerly direction from the Narrows perpendicular to the State line.

I would like to enter Government's Exhibit 16 here.

(The chart referred to, entitled "Dissolved Oxygen Profile, Sandy Hook-The Narrows, 1960," was marked for identification as Government's Exhibit No. 16.)

MR. CLARK: The results, presented in Government's Exhibit 16, of four sets of samples show that the dissolved oxygen in this area generally exceeded 50 percent saturation, although three of the eighteen values were approximately 50 percent and one value was below 50 percent. Maximum dissolved oxygen saturation was about 70 percent.

I would like to enter Government's Exhibit 17.

(The chart referred to, entitled "Dissolved Oxygen Profile, Offshore Staten Island," was marked Government's Exhibit No. 17 for identification.)

MR. CLARK: Government's Exhibit 17 presents the results of samples collected at eight stations, starting at Arthur Kill and extending along the southeastern shore of Staten Island. Nine of the thirty-two samples had dissolved oxygen saturation values of less than 50 percent, with two of these below 30 percent. At five stations on a profile about one mile off the Staten Island shore, nine of the twenty-one samples had dissolved oxygen saturations of less than 50 percent, as shown in Exhibit 18.

I would like to enter Government's Exhibit 18 at this point.

(The chart referred to, entitled "Dissolved Oxygen Profile, New York Waters North of State Line, 1960," was marked for identification as Government's Exhibit No. 18.)

MR. CLARK: Two of these samples had saturations of approximately 30 percent. Most of the lower values occurred along the western ends of the two profiles in Raritan Bay.

MR. GLENN: It should be pointed out that Interstate Sanitation Commission standards are averages for a week. So by sampling at certain times as to tolerances, it can be influencing data like this quite a bit. It is not an instantaneous standard, but a particular area of water for a week's time.

MR. CLARK: Very good. Thank you. That will give us a better set of data.

Thus, Bay waters along the Staten Island shore line and one mile offshore had dissolved oxygen saturation values below the 50 percent saturation required for Interstate Sanitation Commission Class A waters. Comparable dissolved oxygen data in New Jersey waters of the Bay were not available for this report.

A VOICE: What was the source of this data, please?

MR. DE FALCO: This was a study by the New York State Conservation Department.

MR. CLARK: Let the record so show.

SUMMARY AND CONCLUSIONS

The waters of the Arthur Kill; the tidal portion of the Raritan River and its tributary; and of the Raritan Bay, the Lower Bay, and Sandy Hook Bay; are extensively used by, and are very valuable to, the 15 million inhabitants in the New York-New Jersey metropolitan area.

Water uses include: navigation; recreation, including bathing, skiing, boating, and fishing; commercial fishing; industrial process cooling; and shellfishing.

The combined sewage and industrial wastes discharged to the waters under consideration have an estimated total biochemical oxygen demand population equivalent of 2,100,000. Of this total 29 percent is attributed to direct waste discharges from industrial plants, mostly on Arthur Kill. An estimated 1,282,000 people are served by the 30 sewerage systems discharging to these waters. Of this population 93 percent resides in New Jersey, and 7 percent in New York. About 63 percent of the sewered population is tributary to systems discharging to Arthur Kill.

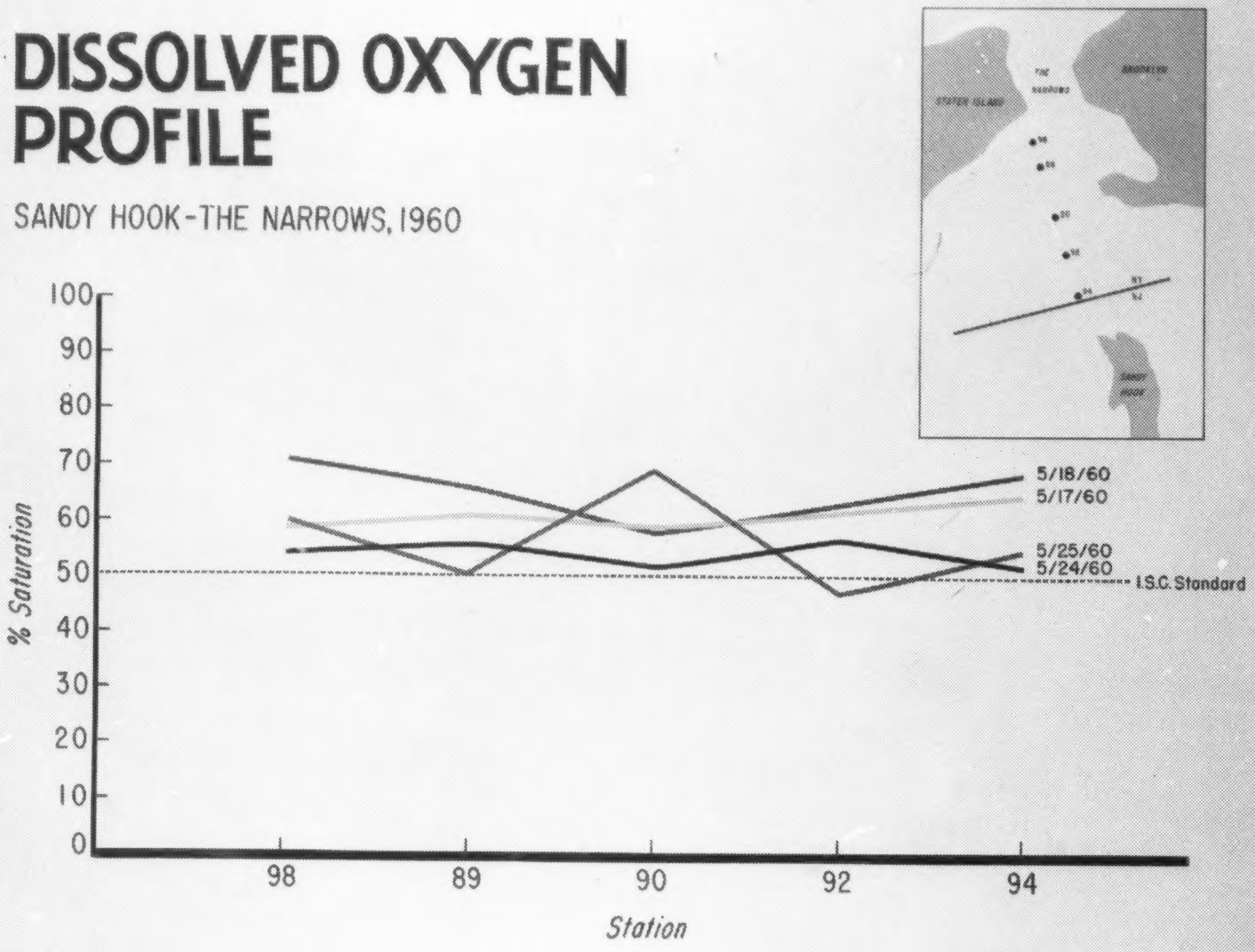
The biochemical oxygen demand population equivalent of effluents discharged from all the sewerage systems is estimated to be 1,550,000, of which 98 percent originates from New Jersey and 2 percent from New York. Population equivalents of suspended solids are estimated at 473,000, of which 96 percent originates from New Jersey and 4 percent from New York.

During the period 1958 to 1961 there have been at least 181 inspections of suspended solids removal at 17 sewage treatment plants, and at least 139 inspections of the coliform content of 15 plant effluents. Of these, 26 percent of the suspended solids tests indicated inadequate removal efficiency and 29 percent of the coliform tests indicated inadequate disinfection. Ten of the treatment plants are reported to be overloaded.

In addition to the direct discharges from sewerage systems and

DISSOLVED OXYGEN PROFILE

SANDY HOOK-THE NARROWS, 1960



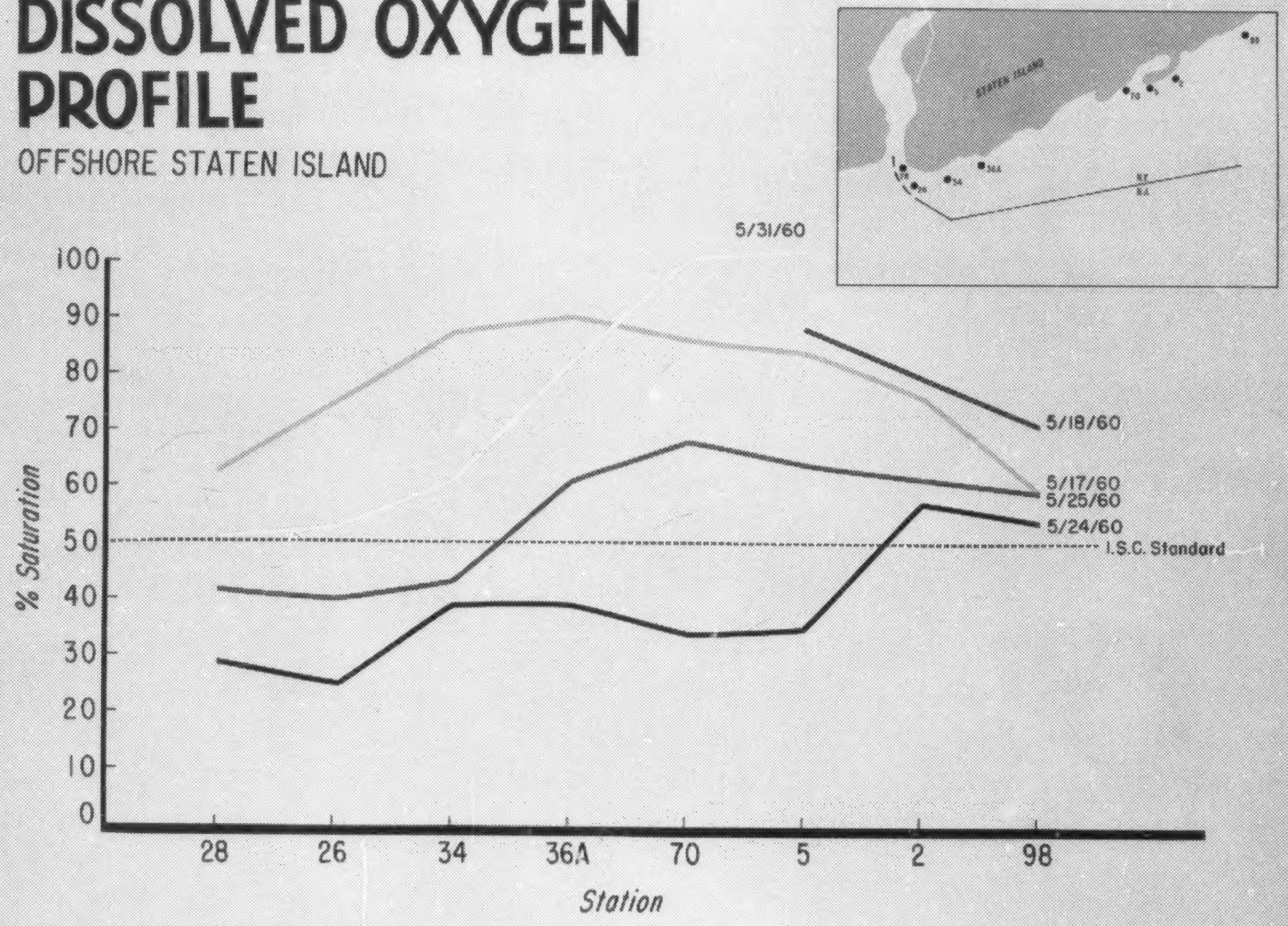
Data – NYSCD

36-a

Government Exhibit 16

DISSOLVED OXYGEN PROFILE

OFFSHORE STATEN ISLAND



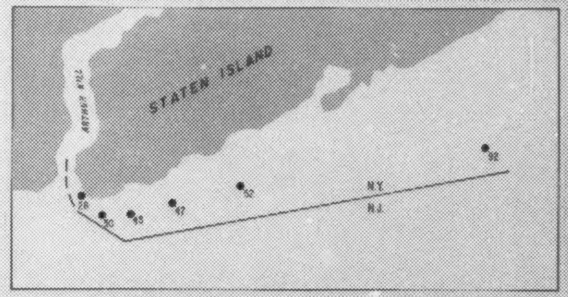
Data - NYSCD

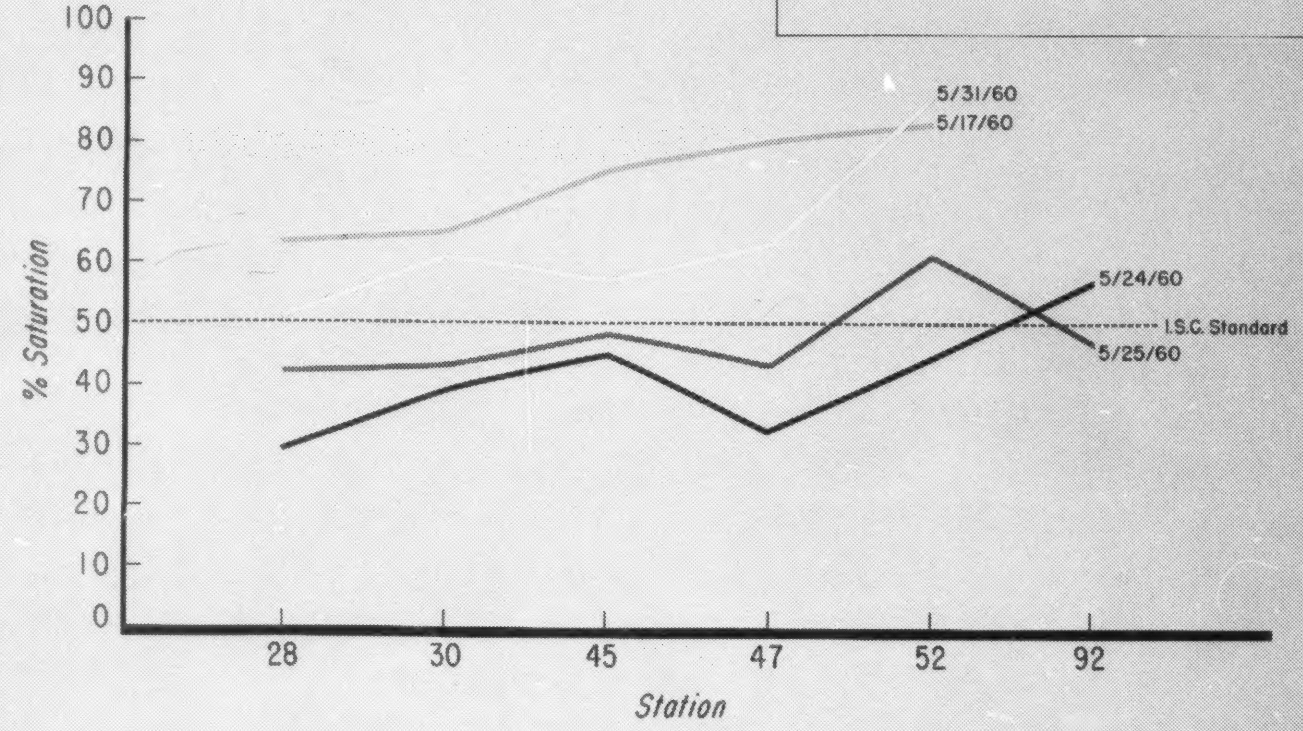
36-b

Government Exhibit 17

DISSOLVED OXYGEN PROFILE

NEW YORK WATERS NORTH OF STATE LINE, 1960


STATEN ISLAND
ARTHUR KILL
N.Y.
N.J.
28
30
45
47
52
92



36-C

Data – NYSCD

Government Exhibit 18

industrial plants the waters receive untreated sewage from large numbers of ships and boats. Lower Bay receives a portion of the residual pollution, from the 10 million people tributary to the Upper Harbor area. These wastes pass through the Narrows and affect the water quality of Raritan and Lower Bay.

Gross pollution of Arthur Kill is evidenced by high coliform densities and low dissolved oxygen values.

In Raritan Bay the greatest bacterial contamination is in the western portion of Raritan Bay, in the vicinity of the southern end of the Arthur Kill, the mouth of the Raritan River, and the outfall from the Middlesex County Sewage Treatment Plant. In Lower Bay the greatest bacterial contamination is in the northeast area of the Bay, generally along the Staten Island shore. Bacterial contamination decreases from these opposite ends of the Bay area toward Sandy Hook Bay and toward the central portion of the Bay area.

Oxygen depletion is excessive in the extreme western end of the Bay area and along a portion of the Staten Island shore. There is improvement towards the central and eastern end of the Bay area.

The excessive bacterial contamination of Arthur Kill renders its water potentially hazardous to the health of those who use it for any purpose that might permit ingestion of even small quantities of the water. The low dissolved oxygen content of several miles of the Kill is damaging to aquatic life.

The waters of the beaches along both the upper and lower ends of Staten Island's southeastern shore, and along the New Jersey shore in the vicinity of the mouth of Raritan River and the southern end of Arthur Kill, have bacterial contamination in excess of that considered safe for bathing. The offshore waters of these same areas present a health hazard to those who use them for boating, skiing, or fishing.

All clam beds in the Bay area were closed by New York and New Jersey authorities on May 1, 1961, but subsequently New Jersey reopened Sandy Hook Bay for clamming. An epidemiological survey established the fact that a substantial number of cases of hepatitis resulted in early 1961 from the consumption of raw clams taken from Raritan Bay.

It is evident that pollution of waters of the Bay area and its tributaries by sewage and industrial wastes discharged from adjacent areas in New York and New Jersey constitutes pollution of interstate waters subject to abatement under the Federal Water Pollution Control Act, as such pollution endangers the health and welfare of persons in a State other than that in which the discharges contributing to such pollution originate.

MR. STEIN: Thank you, Mr. Clark, for a very thorough and comprehensive statement.

Are there any comments or questions by the Interstate Commission?

DR. KANDLE: I would just like to make a note that portions of the Navesink River have also been reopened for shellfish taking.

DR. WENDELL: Mr. Chairman, there are several questions that I would like to ask of Mr. Clark. Before I do, or before we do, will Mr. Clark also be available for questioning this afternoon on the summary?

MR. STEIN: Mr. Clark will be available throughout the conference.

DR. WENDELL: Then is this an appropriate time at least to ask several questions on what we have just heard?

MR. STEIN: You may want to wait until your presentation, or you may want to ask him the questions now.

DR. WENDELL: May we do both? May we ask some at this time?

There is a good deal in what Mr. Clark has said that frankly I am not competent to comment on, and perhaps individually we may not, without discussing it first.

MR. STEIN: We would certainly want to give you an opportunity to discuss this and then ask your questions later, if that is what you would prefer to do.

DR. WENDELL: Then in that case I have only two questions I would like to ask at this particular time, with the understanding that we may wish to discuss Mr. Clark's statement further this afternoon. One of them, perhaps, Mr. Stein, might be addressed to you, if that is appropriate.

In your opening statement and in the notice that we received for the conference, we understood in the language of the statute that this conference was being called on the basis of the statutory language -- surveys, reports, and so on. Was there any request made of the Public Health Service to hold a conference such as this, or is this a conference being held at the instance of the Public Health Service?

MR. STEIN: This is being held at the instance of the Public Health Service.

DR. WENDELL: The only other question I have in this, and this is perhaps only a preliminary one, is this: I understand, Mr. Clark, that your statement is a survey of conditions as you gather them to be from the several sources that you used in making your presentation. There is no inference, or, you would not contend, would you, that waste disposal is not one of the very legitimate and normal uses of bodies of water?

MR. CLARK: I do not consider waste disposal a legitimate use for a body of water where it might endanger health or welfare.

DR. WENDELL: That may be true, but in determining the use to which water is to be put, one of the considerations is use for waste disposal. Isn't that right? That may make other uses inappropriate, or it may be you would prefer not to use it for waste disposal, but waste disposal is one such purpose, isn't it?

MR. CLARK: I do not consider waste disposal such a purpose unless the waste is adequately treated and will not interfer with the other legitimate water uses it should be put to.

DR. WENDELL: In other words, your view is that waste disposal is the least in priority of the uses of water. Is that the position you take?

MR. CLARK: That is my personal opinion. It does not necessarily reflect the opinion of the Surgeon General.

MR. STEIN: Does the Interstate Sanitation Commission, Mr. Glenn, or any of the other people with you, wish to ask any questions?

MR. GLENN: No.

MR. STEIN: New Jersey?

DR. KANDLE: Mr. Chairman, we have had presented here a good deal of data, some of it from a large number of samples, and some from exceedingly small numbers of samples, in which the numbers game gets pretty important in regard to this percentage business. It would take quite a while to study Mr. Clark's report and to be able to comment.

For example, one of the things that occurred to us is the statement that ten of the plants are overloaded. Such a statement at least in one case is in error, and in others one must deal with definitions and percentage of risk of overloading, and all such data. So I do not think we can dispose of this matter quite so easily as to indicate that all of our questions might be asked right now.

MR. STEIN: We can understand that. I think the purpose of Mr. Clark's report was to take the available information and to try to put it together in the best way he could. I think it is obvious from the report that there are certain gaps and certain material was based on more data than some others.

I have a couple of questions to ask him about some of the data too, but that point is well taken. I think in the preparation of this, as in other reports we do, that our working plans are, of course, available to the States and the interstate agencies to show how we are doing this, and any improvement we can make in refining the data is something we are very much interested in.

MR. CLARK: We attempted not to use any data where they were not statistically significant, or at least were not indicating a trend. The data was tried to be presented in a straight-forward manner, without bias. I may not have achieved that purpose, but that was the intent, at least.

DR. KANDLE: May I say for the record and for Mr. Clark that I have only tremendous admiration for the way he presented the data, but the fact remains that the data may not necessarily have been correct.

MR. KLASHMAN: Dr. Kandle, may I clarify a point on this question of overloading of plants, and Mr. Clark, will you correct me if I am wrong?

I believe that comes from inspections made by the Interstate Sanitation Commission, of which you are a member. These are the facts which they presented. So if these facts are incorrect, it is their baby.

MR. GLENN: We were never asked about any plants and whether they were overloaded or not, by anybody prior to this meeting. It is something you draw on my data about, but not from us. No such thing was ever said. The only one that was ever mentioned was maybe one plant which was under court order because it was --

MR. KLASHMAN: My understanding, Mr. Clark, is that it is based on the design flow, and the flows going into the plants. This is where the conclusion comes from.

MR. CLARK: That is right. That is my impression, of course. This is a consensus of a great many people and not my report alone.

MR. STEIN: I think again the data, as I understand it, was selected where it was thought it was made by a competent agency in accordance with standard methods, and was reasonably representative to indicate that it may have some validity. Obviously a lot of this data was not gathered by us. It was done by other people.

I think at a conference stage, particularly in a complex situation like this, you have to get started somewhere and try to get a general agreement. I do not know any of the specifics there. I think we may consider by and large what Mr. Clark indicates gives a reasonably accurate picture. I would suspect if this has to be changed it would be on the basis of conditions that may prevail.

Are there any other questions from New York or New Jersey?

DR. KANDLE: We have many questions. I don't mean to imply we have none. But I would prefer not to ask them right at this minute.

MR. STEIN: Right. How about New York? Do you have any questions or comments now, Dr. Ingraham?

DR. INGRAHAM: You mentioned the Army standards for bathing. Do you have any fair inkling on what they are based?

MR. CLARK: Yes, sir. I can get it for you. It will take me just a second to get them for you. The Army standards for bathing are these: A Class A water contains between zero and 23 coliforms per 100 milliliters. A Class B water varies from 24 to 240 per 100 milliliters. Over 240 is classified as unsatisfactory.

I would like to add that you have to consider the way those are calculated. They are calculated on the basis of ten samples. It is a result of ten samples. That classification is in a technical bulletin, Medical No. 163, Department of the Army Technical Bulletin Service.

DR. INGRAHAM: Is there any indication of the rationale for this?

MR. CLARK: Well, the Army doesn't very often explain itself.

DR. INGRAHAM: I believe Mr. Dappert has a question.

MR. DAPPERT: I think the record should show, not going into detail, but there should be some explanation of what is a geometric mean and what is a weighted mean.

MR. STEIN: I think that is a very good point. May I get in on your question, because I have the same thing in mind?

I notice in your report you kept referring to geometric mean. We have in other reports not run across that term too frequently. Why was that used?

MR. CLARK: In most reports we use an arithmetic mean. Geometric means were used mainly because much of our data was supplied or calculated originally as a geometric mean, and it seems that the geometric mean is the locally adopted method of calculating in New York and perhaps in New Jersey. Correct me if I am wrong on that.

DR. KANDLE: You are wrong.

MR. STEIN: Is there any significant difference in the kind of figures you get from the geometric mean and arithmetic mean?

MR. CLARK: Yes, there is this difference, and I would like for the record to show it. The geometric mean is the product of all of the terms multiplied together and extracting the nth root of that product. That becomes the geometric mean.

A VOICE: Mr. Chairman, I can throw a little more light on it.

MR. STEIN: Pardon me. I think we have to follow procedure here. Otherwise we will be here for a week. I think we will have to ask Mr. Clark to answer the question. Then at the appropriate time we will be happy to call on you, sir.

A VOICE: Thank you.

MR. CLARK: The geometric mean is usually much lower than the ordinary average. The geometric mean and the median value on a large number of terms is usually pretty close together, with the arithmetic average being much higher.

MR. STEIN: You would say if your computations were done by the usual arithmetic mean that the figures you gave would be higher than the geometric mean you used here?

MR. CLARK: I would say that my figures represent the lowest value you could get by any accepted method of calculation.

MR. DAPPERT: Now, what is the weighted mean?

MR. STEIN: Do you know what that weighted mean is?

MR. CLARK: I am sorry. I will have to refer that to some statistician.

MR. STEIN: As I remember this, you used it once. I think you talked about the weighted mean percent saturation for dissolved oxygen data. Was that coming through the Narrows?

MR. CLARK: That was a quote taken from a report, I believe of the Interstate Sanitation Commission.

MR. GLENN: That is taken over a tidal cycle. The data is taken over a tidal cycle, and since you don't take it equally over a tidal cycle it is out of proportion. It is weighted according to its position.

MR. STEIN: In other words, it would indicate some readings in that mean are possibly below the 50 percent saturation?

MR. GLENN: It is possible. What you do is get quite a variation. It might be 20 percent, or 30 percent, during one tidal cycle.

MR. STEIN: That's right. I confess I know we have a causal relationship to work here, but as we go through these pollution cases I always have trouble with the mean concept anyway, because what you may do is work with geometric means, for example, and you may get some kind of curve, but if there are 10 or 15 or 20 percent of the cases where you have pollution, and that is significant, and people use water 10 or 15 or 20 percent of the time, this may be something we want to know. I have the same problem with "mean" and particularly with "weighted mean." I do not know what the significance of it is.

MR. GLENN: If you take a sine curve and have a lot of data on the high point of the curve, and more data taken there than down below, if you took it by itself it would give too much weight to it. So it takes more into account where you took the data during a tidal cycle.

MR. CLARK: The geometric mean was recommended for use by Mr. Shamberger of the Maryland State Health Department as representing the nearest true value of average pollution that would occur in a body of water providing a sufficient amount of data was available. It does this: The geometric mean minimizes the high value and minimizes the effect of the low values, and tends to measure the centralized tendency of the series of terms to the best figure available. However, it is usually lower than the arithmetic average, and if you have a sufficient amount of data the geometric mean and the median value usually do not have any significant difference between them. But that has to be analyzed on each set of data.

MR. STEIN: Are there any other questions or comments?

DR. INGRAHAM: Mr. O'Leary of the New York City Department of Public Works would like to comment briefly on Mr. Clark's report.

MR. STEIN: Yes.

MR. O'LEARY: I noted in the summary of your report you were quoting other studies on the Arthur Kill, and no mention was made of the study made by the engineers of the Department of Public Works. It may be you did not know that study was made. I thought we might be permitted to submit that and reference made to it in your report.

MR. STEIN: Did you put the bibliography into the record, or take that study into account, Mr. Clark? Do you have that study in account?

MR. KLASHMAN: Mr. O'Leary, which year is this?

MR. O'LEARY: This was made about the year 1957.

MR. CLARK: We did not try to take into account every report.

MR. O'LEARY: I will be glad to submit it and have it included with the others.

MR. STEIN: We would be happy to have it included in the bibliography and included in the report as New York Exhibit Appendix A.

MR. O'LEARY: I would like also to note that I don't know whether that was mentioned before, about not having the sewage treated. Minor though it may be, I think it should be mentioned also that it is being done at Fort Wadsworth.

MR. STEIN: Do you have any information in the report on Fort Wadsworth?

MR. KLASHMAN: Mr. O'Leary, from my discussions with the Commanding Officer of Fort Wadsworth it is our understanding that they are tied into the New York City system, and it is their understanding when you put treatment into that area they will be tied into it. Fort Wadsworth have not been treated because they tie into our city sewer system.

MR. O'LEARY: They are taken care of by the Oakwood Beach Sanitary Sewer, but Fort Wadsworth is at the northern terminus. It seems to me it is a very simple matter if you are pumping sewage, to put a pumping station in to pump it into the Oakwood Beach sewage treatment plant.

MR. KLASHMAN: We have had discussions with the Commanding Officer of Fort Wadsworth and the First Army Engineer. I can assure you if this is so we will discuss it. Mr. Wechter, do you have anything to say on that? Mr. Wechter is from the First Army.

MR. WECHTER: Yes. It is connected with the New York City sewage system at two points -- on Bay Street and on Conference Street. All the sewage is contributed to the New York City sewage system.

MR. O'LEARY: The fact remains that is untreated, though.

MR. STEIN: Yes. The rule we do follow in pollution control cases is this: Where an installation or an industry goes into a municipal sewer, the municipality is legally and technically responsible for the treatment of that waste. In other words, if a plant is on a municipal system we do not list those plants individually, or those installations individually. It is only where plants generally have an outfall going into waters.

On this I would like to ask Mr. Clark a question. You listed certain industries here. Have you in your investigations found any other industries which might go into the waters in question?

MR. CLARK: I would like for the record to show I do not know whether these go into the Arthur Kill or not, but I have personally surveyed the Arthur Kill and I have noted that the following industries were in a location where it would be possible, if they wished, to dump their wastes into the Arthur Kill.

MR. STEIN: Would you care to give us that list?

MR. CLARK: Yes, sir. This is the list:

"1. Borne Chemical
2. NOPCO (new plant-under construction)
3. Sinclair (storage)
4. Monsanto Chemical
5. Foster Wheeler (metal welding)
6. Atlantic Sulphur
7. American Agriculture and Chemical
8. U. S. Metal & Refining
9. Reichold
10. Armour
11. Blaw-Knox
12. Hess Oil Refinery
13. Public Service Utilities
14. Modern Solvent & Chemical
15. American Smelting & Refinery
16. Union Carbide (plastics)"

DR. WENDELL: Did I understand, Mr. Clark, that this is a list of installations that could dump into Arthur Kill if they wanted to, but that were not now doing it? Is that correct?

MR. CLARK: My statement was I do not know where they dump the sewage. I do not have the information available, but they are located on the Arthur Kill in such a proximity that they could dump into it.

DR. WENDELL: But you don't know what happens to that waste?

MR. CLARK: I stated that.

MR. STEIN: That's right. If we could get some information on that it would be helpful. The first problem we have is locating all of the sources.

Are there any further questions of Mr. Clark?

DR. COLOSI: My name is Natale Colosi. The statement was made that portions of Raritan Bay were opened for shellfish in 1941. I think that was based on a joint survey made by the Public Health Service, the City of New York Health Department, and State of New York Health Department, and State Conservation Department, and the New Jersey State Health Department; and I participated in that survey for Wagner College and the Staten Island Assembly. I wondered how the present bacteriological findings of sanitary surveys compare with the findings that authorized the reopening of the Bay at that time.

MR. STEIN: Are you familiar with that, Mr. Clark?

MR. CLARK: I am not familiar with the original work authorizing the reopening of the Bay at that time.

DR. COLOSI: I think I have the figures in my files. Mr. Adams, who was your Chief Engineer at that time, cooperated in this survey.

MR. STEIN: We would be very happy to have those. If anyone else is familiar with that, we would be very happy to have those and make the comparison.

DR. KANDLE: May I say there was one practical test. I do not have those data because I have never seen the 1941 data entirely, but there is one practical test, and that is that the waters shall meet Public Health Service standards.

DR. COLOSI: Yes.

DR. KANDLE: And they were closed because of hepatitis.

MR. STEIN: Are there any other comments or questions? If not, I have a few questions, Mr. Clark.

One, I noted in many of your reports that you use a fecal streptococci test. How is it that was not used in this one?

MR. CLARK: The reason that the fecal streptococci test was not used in this report was because I was unable to find any information on fecal streptococci density in these waters. The same is true that I frequently use fecal coliform tests, or a test for coliform of fecal origin, as contrasted with those of non-fecal origin. That was not used in this report for the same reason.

I could find no information available and I have no personal data of my own to submit.

MR. STEIN: Do you think that will be useful?

MR. CLARK: If I were doing the survey, I would recommend it highly. Both tests.

MR. STEIN: There is another question that maybe one of you can answer about fish kills. Have there ever been any fish kills in the area recently? Do you know that, Mr. Klashman?

MR. KLASHMAN: We had a report of one fish kill in the Raritan River that we understand is due to the discharge of some wastes from a barge which was supposed to be discharged out to sea. This is the only recent fish kill we have any knowledge of.

MR. STEIN: Were they wastes taken by barge out to sea?

MR. KLASHMAN: As I understand it, this barge is a barge which barges wastes from the Peter Schweitzer Paper Company, and the wastes are barged out into the outer harbor.

MR. STEIN: Are there any other wastes in this area barged out to sea? Is this a pretty extensive practice?

MR. KLASHMAN: The Supervisor of New York Harbor issues permits for the barging of sludge from municipal sewage treatment plants and various industries, and other wastes, to specific disposal areas at sea. We do not have any detailed knowledge of the extent of the surveillance program to insure that these wastes are always discharged into the specific disposal area.

MR. STEIN: Normally barge disposal is somewhat controversial. I always ask the question, what happens in the case of strikes and what happens in the case of storms, when they can't go. Do you have sufficient storage area to take care of the wastes? Do you know that the answer to that question is in New York Harbor?

MR. KLASHMAN: We have no knowledge of the provisions for handling wastes during foul weather or labor strikes.

Mr. Wuesterfeld, who is the Assistant to the Supervisor of New York Harbor, is here and may discuss this later.

MR. STEIN: We will wait until his presentation. I have another question or two.

I do not know but what it may be appropriate for the Interstate Sanitation Commission to answer these questions, or you may want to wait till after lunch.

1. If you do have any information on these additional plants that Mr. Clark gave to us, we would like to have it, because if we find they are going into a municipal system, and that is where they are connected into, it would seem to me this would simplify our problem. You may want to attempt to provide it now or later.

Now, in Mr. Clark's report he made reference to your 1959 annual report where you discuss holding meetings with various industries. I think it might be indicated what has happened as a result of these meetings with the industries, and whether any plants will put in treatment, and possibly we have similar information.

MR. GLENN: It will be covered partly in our statement, and then if there are any additional questions you can ask them at that time.

MR. STEIN: All right. That is covered in your statement. Because I did not want to let this go, since it is in his report.

I also had another one, and this you may want to cover in your statement too. Mr. Clark indicated that on a number of occasions in his report, when you check the plant there is a failure to meet requirements of your Commission. The question naturally comes up what happened after they failed to meet the requirements, inasmuch as 50 percent of them do. Was the plant notified, and was the State notified, and what action was taken?

MR. GLENN: It was a combination. A little bit of each, and different types of things done for each plant. In some cases you notify the operator to see if he can control it. In some cases -- in extreme cases -- in two or three cases, which you had on the chart, where it failed, they got these court orders against them now. So action is being taken on all those cases. But it varies with each case on how you handle it.

Also you reschedule it many times to be sure that the improvement is taking place.

MR. STEIN: Thank you.

Are there any further questions of Mr. Clark?

DR. KANDLE: There is one basic issue I think we ought to get some clarification on. You are including the Arthur Kill as part of the Raritan Bay. Is that right?

MR. STEIN: We are including Arthur Kill as a tributary of Raritan Bay.

DR. KANDLE: But it didn't seem to me that the Government made any case for the influence of the Arthur Kill on the Raritan Bay, so one may raise a question to say whether the Arthur Kill is pertinent to this conference.

MR. STEIN: No, I don't think we are making a case against anything at this stage, but we are trying to adduce some facts we can agree on. As I understood from Mr. Clark's statement -- and again let me see if I understood it correctly -- he said the movement in Arthur Kill was back and forth and any bit of water in there, and consequently any pollution in there, could reach any portion of Raritan Bay.

DR. KANDLE: We would be interested in seeing any such data to support that.

MR. STEIN: This was the statement made in his report, as I recall it.

DR. KANDLE: I challenge it.

MR. STEIN: Do you want to comment, Mr. Clark?

MR. CLARK: I would prefer to wait to comment on that.

MR. STEIN: All right. Are there any further questions?

DR. INGRAHAM: Dr. Colosi raised a question about the oystering closing and then being reopened in Raritan Bay. I think perhaps Mr. Udell of the State Conservation Department might throw some light on that.

MR. STEIN: Could we wait on that?

DR. INGRAHAM: Surely.

MR. STEIN: Because Dr. Henderson is going to talk about oysters and in the New York presentation it might be more appropriate to have that come out at that time.

DR. INGRAHAM: Surely.

MR. STEIN: If we have no further questions of Mr. Clark at this time, perhaps we can call on Dr. Henderson to continue with the Public Health Service presentation.

Dr. Henderson.

What we intend to do is to have Dr. Henderson's presentation and then have a break for lunch.

How long do you think your presentation will take, Dr. Henderson?

DR. HENDERSON: It should not take more than fifteen minutes.

MR. STEIN: All right. It will not take more than about that time, and then we can break for lunch.

STATEMENT OF DR. DONALD A. HENDERSON, SENIOR SURGEON, CHIEF SURVEILLANCE SECTION, EPIDEMIOLOGY BRANCH, COMMUNICABLE DISEASE CENTER, PUBLIC HEALTH SERVICE, U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE, ATLANTA, GEORGIA

DR. HENDERSON: I will stand and perhaps I can be heard best that way.

My name is D. A. Henderson, Chief, Surveillance Section, Epidemiology Branch of the Communicable Disease Center of the Public Health Service.

The report I present is a preliminary one. Data is still being collected. It is a brief discussion of the relationship of infectious hepatitis to the consumption of raw clams taken from Raritan Bay.

An epidemic of infectious hepatitis traceable to the consumption of raw clams from the Raritan Bay occurred this year in the Northern Atlantic

Coastal States which led, on May 1, to the closing of the Bay to the harvesting of clams. Investigations leading to these developments were prompted by the occurrence in New Jersey during the winter and spring of this year of an unusually large number of cases of hepatitis among adults. The State of New Jersey and the Communicable Disease Center initiated studies to determine the cause. Early studies revealed that the patients were predominantly males in their late twenties and thirties and that they commonly were in the higher socioeconomic brackets. Approximately 50 percent of the adults gave a history of having eaten raw clams during the preceding ten to sixty-day period.

Because this appeared to be a notable correlation, careful control studies to determine the clam eating habits of others residing in the same neighborhoods as the cases were carried out by the New Jersey State Health Department. In each of the surveys, the residence of the case was first identified then families a block away were interviewed.

This will be Table 8.

(The tabulation referred to, entitled "History of Consumption of Raw Clams Within 120 Days of Interview Among Various Population Samples in New Jersey," was marked for identification Government's Exhibit Table 8.)

DR. HENDERSON: Table 8 shows that the percentage of controls who had eaten raw clams within the preceding 120 days was 4.8 percent in Woodbridge Township; 15.1 percent in Monmouth County and 8.1 percent in Newark City. Each asterisk denotes a person who stated he had eaten raw clams within this time interval and who, at the time of interview, was found to have symptoms consistent with those seen early in hepatitis. One man, in fact, was noted to be overtly jaundiced. Thus, among the controls, there was one definite and three questionable cases of hepatitis uncovered.

As shown in this Table 8, the frequency of raw clam consumption within the preceding 120 days among adults in the different areas showed an overall figure of 9.7 percent.

As noted previously, 50 percent of the adults with hepatitis gave a history of raw clam consumption in the preceding 10 to 60 days.

To determine the source of the clams and to define the extent of the problem, an intensive investigation was initiated which by its complexity and extent involved the participation of a great many individuals from State and local health departments, various divisions of the Public Health Service and other Federal and State agencies, including the Food and Drug Administration, Conservation Departments, and others. The cooperation of those in the clam industry was excellent. On April 26, a central field headquarters to correlate and compile the information was established in Trenton, New Jersey, and later in May transferred to Atlanta. This was and is under my

TABLE 8

HISTORY OF CONSUMPTION OF RAW CLAMS WITHIN 120 DAYS OF INTERVIEW AMONG VARIOUS POPULATION SAMPLES IN NEW JERSEY

Locale where Survey done	Questioned	Adults Number of Persons Ate Clams	Percent
Woodbridge Township	42	2*	4.8
Monmouth County	126	19*	15.1
Newark City	285	23**	8.1
Total	453	44	9.7

Each (*) denotes an individual who was found at the time of the interview to be suffering from definite or suspect hepatitis.

direction. Intensive studies revealed the primary source of the incriminated clams to be the Raritan Bay.

On May 1, Dr. Roscoe P. Kandle, New Jersey State Commissioner of Health, closed the New Jersey controlled portions of Raritan Bay. Almost immediately thereafter, New York State officials acted to close the New York waters of Raritan Bay and officials of New York City acted to restrict the sale of Raritan Bay clams in the major wholesale market, the Fulton Fish Market. A summary of information collected as of that date was published in two Public Health Service publications, Hepatitis Surveillance Report Number 5, dated May 3, 1961 and, in summary form, the Morbidity and Mortality Weekly Report of May 5, 1961 (Vol. 10, No. 17).

Since that date, continuing studies relating specifically to this problem have been pursued in New Jersey, New York, Connecticut and in other States in the vicinity of Raritan Bay.

More detailed information on the occurrence of adult hepatitis cases in other States throughout the country has also become available as a result of the initiation of an Adult Hepatitis Surveillance program, modeled, in part, after the National Poliomyelitis Surveillance program. In mid-April each State was requested to participate in this program by submitting to the Hepatitis Surveillance Unit for analysis, individual epidemiologic case forms for each reported case of hepatitis in an adult occurring since March 1. Through June 30, 1961, almost 4,000 reports from 37 States had been received.

Information obtained through the Adult Hepatitis Surveillance Program which is pertinent to the Raritan Bay has been analyzed and is presented along with data obtained through the variety of special studies carried out.

Frequency of Clam Consumption Among Adult Hepatitis Cases

The number of individual hepatitis case reports received from each State and the number and percent of these who were reported to have consumed raw clams during the preceding ten to sixty days is shown in Table 9.

I am afraid that this is a bit small to read.

MR. STEIN: Would you label one of those Table 9 and the second one Table 9-A?

(The table referred to, entitled "Cases of Hepatitis in Adults, U. S. - 1961, Reported to Hepatitis Surveillance Unit Through June 30, 1961," consisting of two sheets, was marked respectively for identification as Government's Exhibits Table 9 and Table 9-A.)

DR. HENDERSON: The total number of cases listed here is 3,883. This is for the entire United States. 631 of these people had consumed clams, for an overall percentage of 16.3 percent.

The percentages by States run from 50.4 percent in New Jersey and 30.2 percent in Connecticut, and on down from there.

It may be observed that the greatest frequency of raw clam consumers among hepatitis cases centers in those States on or near Raritan Bay. As I mentioned, in New Jersey, of 742 hepatitis cases reported, 374 or 50.4% consumed raw clams during this period. Other States in which over 10 percent of the cases had eaten raw clams in the appropriate period before onset are Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania and Delaware. Atlantic Coastal States more distant from Raritan Bay (Maine, New Hampshire, Maryland and Virginia) show frequencies ranging from zero to 4.3 percent.

Hepatitis case rates by county for raw clam consumers and non-consumers for the Atlantic Coastal States from Maine to Maryland are depicted in Exhibit 21. The highest incidence rates by county of residence for the groups of raw clam consumers is seen to concentrate sharply a round the Raritan Bay area. Incidence rates for non-clam consumers assume a more diffuse pattern without such notable geographic concentration.

I would like to offer Exhibits 21 and 22.

(The map referred to, entitled "Incidence of Infectious Hepatitis (Adult Cases), Northeastern States, January-June, 1961, Non-Consumers of Raw Clams," was marked for identification as Government's Exhibit No. 21.)

(The map referred to, entitled "Incidence of Infectious Hepatitis (Adult Cases) Northeastern States, January-June, 1961, Consumers of Raw Clams," was marked for identification as Government's Exhibit No. 22.)

DR. HENDERSON: In these exhibits are presented separately the attack rates for adults by county for those who had and who had not consumed raw clams during the preceding 10 to 60 days.

Exhibit 21 shows the attack rates for adults by county for non-raw clam consumers. As you see, the higher rates are dispersed throughout the States. There are counties in all different parts of the State showing high rates. However, if you take the rates for the consumers of raw clams, that is, hepatitis cases among consumers of raw clams, we see high attack rates concentrated immediately around Raritan Bay, which fall off rapidly as we move away from the Bay and into more peripheral areas. These rates are very low going down to zero. It is simply taken on the basis of eating or not eating raw clams. The source or origin of the clams is not considered here.

TABLE 9

CASES OF HEPATITIS IN ADULTS, U. S. - 1961 REPORTED TO HEPATITIS SURVEILLANCE UNIT THROUGH JUNE 30, 1961

State and Region	Total Cases*	Clam consumption	Percent	Cases Traceable	Raritan Bay		Other Source	Not traced
					Exclusive	Consistent with		
UNITED STATES	3,883	631	16.3	554	73	298	66	117
NEW ENGLAND								
Maine	18	0	0.0					
New Hampshire	18	0	0.0					
Vermont								
Massachusetts	85	12	14.0	8	1	3	-	4
Rhode Island	33	6	18.2	4	-	2	-	2
Connecticut	106	32	30.2	27	1	4	13	9
MIDDLE ATLANTIC								
New York	498	103	20.7	76	8	26	2	40
New Jersey	742	374	50.4	358	63	225	39	31
Pennsylvania	396	72	18.2	54	-	30	8	16
EAST NORTH CENTRAL								
Ohio								
Indiana	133	0	0.0					
Illinois	92	6	6.5	6	-	2	-	4
Michigan	223	3	1.3	2	-	-	-	2
Wisconsin								
WEST NORTH CENTRAL								
Minnesota	124	1	0.8	1	-	-	-	1
Iowa								
Missouri	40	0	0.0					
North Dakota	15	0	0.0					
South Dakota	2	0	0.0					
Nebraska	12	0	0.0					
Kansas	116	0	0.0					

TABLE 9 (Continued)

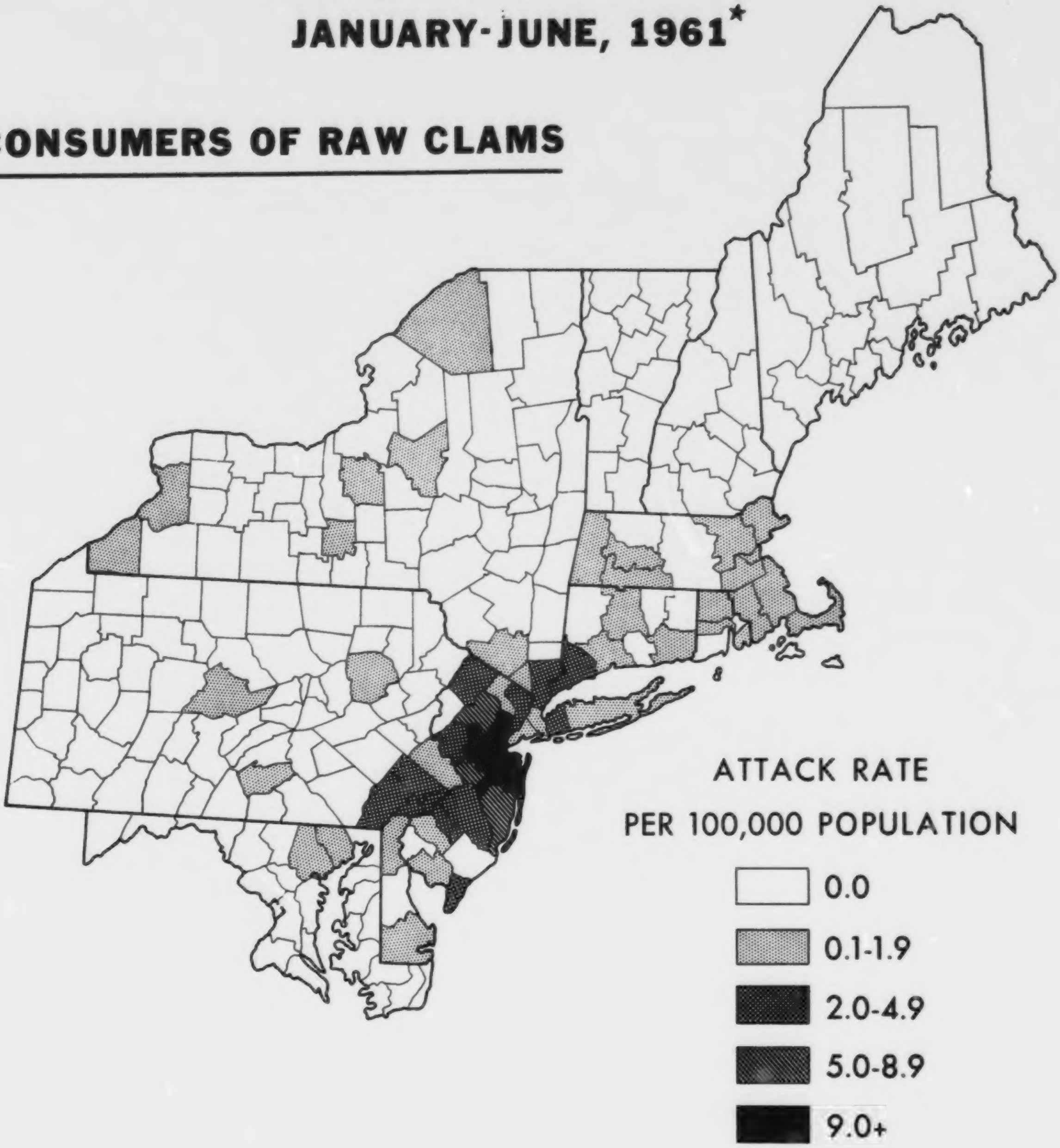
CASES OF HEPATITIS IN ADULTS, U. S. - 1961
REPORTED TO HEPATITIS SURVEILLANCE UNIT
THROUGH JUNE 30, 1961

State and Region	Total Cases*	Clam consumption	Percent	Cases Traceable	Raritan Bay		Other Source	Not traced
					Exclusive	Consistent with		
SOUTH ATLANTIC								
Delaware	24	6	25.0	5	-	3	1	1
Maryland	46	2	4.3	1	-	1	-	-
D. C.	14	1	7.1	1	-	-	-	1
Virginia	124	4	3.2	3	-	2	-	1
West Virginia	109	0	0.0					
North Carolina								
South Carolina								
Georgia	62	1	1.6	1	-	-	1	-
Florida	89	2	2.2	2	-	-	-	2
EAST SOUTH CENTRAL								
Kentucky	50	0	0.0					
Tennessee	227	0	0.0					
Alabama	108	2	1.9	2	-	-	2	-
Mississippi								
WEST SOUTH CENTRAL								
Arkansas	75	0	0.0					
Louisiana	56	0	0.0					
Oklahoma	8	0	0.0					
Texas	105	1	1.0	0				
MOUNTAIN								
Montana	15	1	6.7	1	-	-	-	1
Idaho								
Wyoming								
Colorado	6	0	0.0					
New Mexico	1	0	0.0					
Arizona								
Utah	14	0	0.0					
Nevada								
PACIFIC								
Washington	5	0	0.0					
Oregon								
California	80	2	2.5	2	-	-	-	2
Alaska								
Hawaii	3	0	0.0					

*Excluding serum hepatitis and not viral hepatitis

INCIDENCE OF INFECTIOUS HEPATITIS (ADULT CASES)
NORTHEASTERN STATES
JANUARY-JUNE, 1961*

CONSUMERS OF RAW CLAMS


ATTACK RATE
PER 100,000 POPULATION
0.0
0.1-1.9
2.0-4.9
5.0-8.9
9.0+

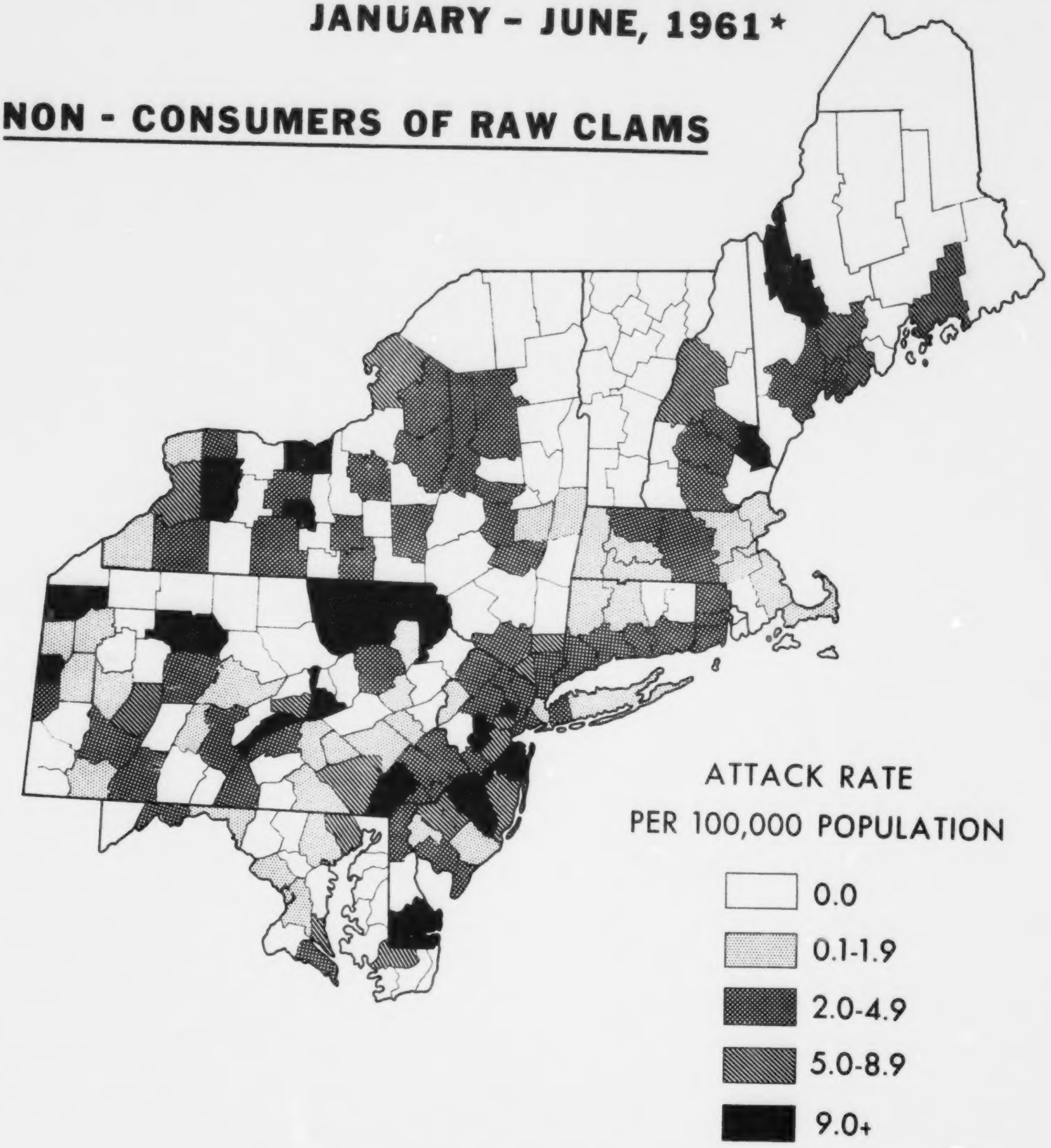
*CASES REPORTED TO HEPATITIS SURVEILLANCE UNIT THROUGH JUNE 30, 1961.

Government Exhibit 21

52-C

INCIDENCE OF INFECTIOUS HEPATITIS (ADULT CASES)
NORTHEASTERN STATES
JANUARY - JUNE, 1961*

NON - CONSUMERS OF RAW CLAMS


ATTACK RATE
PER 100,000 POPULATION
0.0
0.1-1.9
2.0-4.9
5.0-8.9
9.0+

*CASES REPORTED TO HEPATITIS SURVEILLANCE UNIT THROUGH JUNE 30, 1961

Government Exhibit 22 52-d

Tracing of Clam Sources

Of the 631 cases who reported consuming raw clams in the ten to sixty-day period prior to onset of illness, 554 were able to identify specifically the establishment where the clams were obtained. For these cases the source was considered potentially "traceable" (Table 8). Of this number, 394 had consumed raw clams from one retail source only.

The majority ate them in restaurants; relatively few purchased them for consumption at home. When purchased for home consumption, they were commonly obtained from seafood markets or groceries, rarely from the clammers themselves or from shippers near clam beds.

The restaurants, markets and other retailers mentioned by the cases proved to be nearly as numerous as the cases themselves. The establishments were each visited and invoices examined. Restaurants and small retail markets were found commonly to be supplied by one distributor only. However, when the distributors were similarly queried, it was found that they not infrequently were supplied by more than one source and these sources sometimes by two or more additional sources. In all, the names of over 1,100 restaurants, distributors and other suppliers have been mentioned during the course of the investigation. It was apparent, therefore, that clams served on any given day in many of the restaurants or sold in many of the markets might have derived from several clamming areas.

Several establishments, however, were discovered which, through their channel of supply, received clams originating only from the Raritan Bay. Approximately 100 patients had eaten raw clams sold at these establishments. Of this group, 73 noted these retail outlets to have been their only source for raw clams during the previous ten to sixty-day period. Since, so far as can be determined, these 73 individuals consumed raw clams from the Raritan Bay only during the incubation period, they are designated as "exclusively - Raritan Bay" in Table 8.

In addition to these 73 patients, the source of the clams consumed has been traced for 364 other cases. Many obtained clams at more than one retail outlet and many of the retail outlets received clams through distribution channels in which clams from several harvesting areas were present. Identification specifically of which clams the patients might have eaten on any particular day was not possible. Careful checking of the supply patterns did show that for 298 of the 364, Raritan Bay clams were in the distribution channels reaching the retail outlets where they obtained their clams. These illnesses may be considered only to be "consistent with" (Table 9 and 9-A) exposure to Raritan Bay clams.

For 66 of the cases traced to date, it would appear from available records, that raw clams which had been consumed during the 60 days preceding illness specifically could not have included Raritan Bay clams (listed as "other" in Table 9 and 9-A). Twelve of these cases, all from Connecticut, had eaten clams dug by themselves or friends in a single area near Greenwich, Connecticut, which is restricted and specifically posted as being for "bait clamming" only. The other sources for these clams are scattered geographically. They may represent cases resulting from contact spread of infection, the consumption of clams being only incidental, or, since we know that records from some of the distributors are not complete, it is possible that they also may have consumed Raritan Bay clams.

As of June 30, sources for 117 cases had not been traced. The investigation, however, is still in progress.

Two Restaurants of Particular Interest

Two restaurants have been mentioned unusually frequently by patients as places where they ate raw clams. One is located approximately 15 miles northwest of the western end of Raritan Bay; the other is situated on the Bay. At the former restaurant, 14 persons from three States and seven counties had eaten raw clams ten to sixty days previously. For thirteen of the fourteen, this is the only recorded exposure. This restaurant receives clams from a fish market in Plainfield, New Jersey, whose only recorded supplier is a shipper who buys from clammers operating on the Raritan Bay and its appendages, Sandy Hook Bay and the Navesink River. The second restaurant was also mentioned by fourteen persons, eight of whom gave this as their only source of clams. This restaurant received several shipments of clams weekly, all except two of which were from a relative who operates a local fishery. The fishery is supplied by two clammers who are stated to operate on the western end of the Bay.

Summary

Of 3,883 cases of hepatitis among adults which have been appraised thus far, 631 or 16 percent reported consuming raw clams during the preceding ten to sixty days. Those with hepatitis who had consumed raw clams concentrate in the Atlantic Coastal States from Massachusetts to Delaware, with a particular concentration in New Jersey. Within these States, there is a further notable concentration of cases in those counties adjacent or proximal to the Raritan Bay. Of 554 cases who were able to provide sufficient information to permit tracing of the clam sources, 437 have been traced to date. From available records, 73 of these consumed raw clams deriving only from the Raritan Bay. An additional 298 consumed raw clams obtained from an establishment whose channels of supply included Raritan Bay clams as well as clams from other sources. Sixty-six cases reported eating clams from sources which presumably could not have had Raritan Bay clams in their supply channels. Twelve of these relate to a single, restricted area on the Connecticut shore.

From the epidemiological evidence collected, it may be concluded that contaminated clams harvested from Raritan Bay were responsible for significant numbers of hepatitis cases among adults in the Northeastern States.

MR. STEIN: Thank you, Dr. Henderson.

Are there any comments or questions? New Jersey?

DR. KANDLE: No questions.

MR. STEIN: New York?

DR. INGRAHAM: No.

MR. STEIN: The Interstate Sanitation Commission?

DR. WENDELL: Yes, I have a couple of questions I would like to ask.

From the information that you have given us, Dr. Henderson, is it a reasonable construction of your findings to say that apparently in those areas, that is, if hepatitis is connected with polluted waters in which clams and other shellfish are found, is it reasonable to say that those shellfish that are taken from areas farther away from population concentrations and industrial concentrations, are the safer ones? Is that a proper interpretation of your data?

DR. HENDERSON: I don't think that we can go so far as to say specifically where, for instance, on the Bay the clams were derived.

DR. WENDELL: No. I was not asking that. I was asking a broader question.

Raritan Bay is right in a heavily populated metropolitan center -- the largest one that we have in the country, for that matter. When you say that the clams taken from areas farther up north, up maybe as far as New Hampshire and Maine, maybe, and then down as far as Delaware, are less, or seem to be less of a source, aren't you also really saying in view of the geography of the situation, that Raritan Bay happens to be a center of the most heavily populated and most heavily industrialized area we are talking about?

DR. HENDERSON: I think it is a fact that it is a heavily industrialized and populated area, and to date we have been able to implicate only two areas -- one in the middle of this heavily populated area and one up in Connecticut, somewhat away from it. Beyond that I do not know what more we can say.

If you are getting at the question, is it possible for clams, we will say, to be polluted in New Hampshire or Maine, I think the answer would have to be yes.

DR. WENDELL: It is possible, but it is apparently less likely. Is that it?

DR. HENDERSON: All we have is the information on this study. As we go along we may find out that it is possible elsewhere.

DR. WENDELL: I have only one other question that occurs to me at the moment and it is this: Apparently most of the hepatitis cases that you report and that you have information on are not from clam eaters at all, or, at least, not from Raritan Bay clam eaters, or perhaps clam eaters along the coast here. This means apparently there is a much larger hepatitis problem than either clam eating, if that is connected with it, is responsible for, or certainly Raritan Bay clams. Isn't that right? It comes from other places too?

DR. HENDERSON: Oh, indeed. I think there is no question about this at all.

DR. WENDELL: All right.

MR. STEIN: Are there any further questions or comments with respect to Dr. Henderson's statement?

If not, we want to thank Dr. Henderson for a very excellent presentation.

We are thinking of adjourning or recessing for lunch. Does anyone have a compelling statement he wants to make first?

If not, I understand that Room 2803 provides meals and anyone who knows his way around New York downtown can risk it.

Will we be able to get back in an hour, do you think? Is that reasonable. Let's allow an hour and fifteen minutes from now. We should be back at one-thirty. Is that agreeable?

We stand in recess then until one-thirty.

(Whereupon, at 12.20 p.m., the conference was recessed for lunch until 1:30 p.m. of the same day.)

AFTERNOON SESSION

MR. STEIN: The conference is reopened. Mr. Klashman, will you continue?

MR. KLASHMAN: We would like to call for a very brief statement from a couple of the Federal agencies that are represented here. Mr. Wuesterfeld, would you like to make a statement for the Supervisor of New York Harbor?

STATEMENT OF R. H. WUESTERFELD, ASSISTANT TO SUPERVISOR OF NEW YORK HARBOR

MR. WUESTERFELD: Yes, I would. Just to be sure of some of my facts I have some of them written down and if there are any questions I will be glad to answer any questions. My name is Robert Wuesterfeld. I am the Assistant to the Supervisor of New York Harbor, United States Army. I would like to describe briefly the role of the Department of the Army in the problem of pollution of navigable waters of the United States; and from that describe more specifically our role with respect to the interstate waters of the Port of New York with particular reference to Raritan Bay.

The New York District of the Corps of Engineers, United States Army, embraces the waters of the Atlantic Ocean and its tributaries from the New York - Connecticut State Line to but not including Manasquan River and Inlet, New Jersey. Some of the principal waterways included within the limits of the district are, Shrewsbury River, Sandy Hook and Raritan Bays, Raritan River, Newark Bay, Hackensack and Passaic River, all the waters of Upper and Lower Bays, Hudson River, East River and Long Island Sound.

The most general law enforced by the Corps of Engineers with respect to pollution, is Section 13 of the Rivers and Harbors Act of March 3, 1899. This law in essence states that it is unlawful to throw, discharge or deposit any refuse matter of any kind or description whatsoever other than that flowing from streets and sewers and passing therefrom in a liquid state, whereby navigation shall or may be impeded. You will note from the last phrase, that pollution in its broadest interpretation is not unlawful under the statute enforced by the Corps of Engineers but only the deposit of refuse material which is injurious to navigation. This distinction limits the role of the Corps of Engineers in the prevention of pollution.

As a dual function, the District Engineer is also designated as Supervisor of New York Harbor. An Act of Congress adopted on June 29, 1888, established the office of the Supervisor of New York Harbor for the purpose of preventing obstructive and injurious deposits in the tidal waters of the Harbor of New York or its adjacent or tributary waters or those of Long Island Sound within the limits which shall be prescribed by the supervisor of the harbor. Prior to 1952, this office operated separately from the office of the District Engineer. However, by Act of Congress adopted 12 July 1952, the assignment of these functions to an office of the Corps of Engineers was approved. The District Engineer at New York was designated as Supervisor of New York Harbor on July 30, 1952.

A third Federal statute which we enforce as well as the Coast Guard and about every Federal agency in New York, functioning on the waters of the Port of New York, is the Oil Pollution Act of 1924. This Act specifically prohibits the discharge of oil into navigable waters from vessels.

It is interesting to note that the Supervisory Act of 1888 does also permit us to bring the offenders to account, but the Act of 1924 was actually passed to cover pollution of oil in all of the coastal waters of the United States.

The Supervisor of New York Harbor is charged with the responsibility of designating dumping grounds to which the forbidden material may be transported and deposited. For example, one area for the dumping of mud and small stone is located in Atlantic Ocean off the entrance to New York Harbor, 4 miles in a southeast by south direction from Scotland Lightship, another for dumping rock and cellar dirt six and one-quarter miles southeast of Scotland Lightship. Sewage sludge is authorized to be transported to a point not less than eight miles southeast of Scotland Lightship. Waste acid and ferrous wastes are authorized to be dumped not less than 11-1/2 miles in a southeasterly direction from Scotland Lightship. In recent months this latter dumping area has also been designated for the disposal of waste materials originating in the Peter J. Schweitzer Company plant at Spotswood, New Jersey.

In addition to these dumping grounds in the Atlantic Ocean other dumping grounds have been established in Long Island Sound. These areas are in the deeper parts of the Sound and are generally opposite the rivers and harbors along the shore. Areas have also been designated in Hudson River at intervals between Peekskill and Hudson, New York, to take care of material dredged from the harbors and waterways along the section of the Hudson River. Since this hearing is on Raritan Bay, I will not speak on those.

There is a tremendous amount of waste material of every kind and description generated within the Port of New York. During the fiscal year which ended June 30, 1961, more than 31 million cubic yards of material were transported and deposited under permits issued by the Supervisor of New York Harbor. Over 2,250,000 cubic yards of material dredged by use of United States Government equipment, and under contract in improving the waterways of the port were deposited at sea. Material from other than Federal operations amounting to 9,750,000 cubic yards were also deposited at sea. Material deposited on shore, in the Hudson River and Long Island Sound, amounted to about 19 million cubic yards. Of the 9,750,000 cubic yards of non-Federal material which were deposited at sea, 3,400,000 cubic yards were sewage sludge from the City of New York, the Passaic Valley Sewerage Commission, the Joint Meeting Sewage Disposal Commission, the Linden-Roselle Sewerage Authority and the Middlesex County Sewerage Authority; 2,800,000 cubic yards were the total acid and chemical wastes, and the balance was other wastes including mud and other dredged material excavated from vessel berths and slips, cellar dirt and miscellaneous refuse.

Possibly that number of 31 million cubic yards of material might not be significant to you. As an indication of the magnitude of this disposal problem, it has been estimated that all of the material which has been disposed of under permits issued by this office since 1888 would cover Manhattan Island to a depth of 73 feet, or at an average rate of one foot per year.

In addition to issuing the permits for transportation and disposing of waste materials at designated dumping areas, the Supervisor of New York Harbor also patrols the waterways with a staff of inspectors to assure that the materials are disposed of in the authorized dumping areas. Round-the-clock, seven days per week, inspection is made of the dumping grounds and daily inspections are made of the harbor waters and the shorefront. There are shore inspectors and other inspectors in small boats operating five days a week during the normal working day making inspection of the waterfront facilities.

While this office is primarily concerned with the effects of this tremendous disposal operation on navigation, it has always been cognizant of the interest in this matter by other agencies on behalf of the general public. Consequently, this office has always endeavored to secure the advice and approval of all agencies which are likely to have an interest in the matter prior to the issuance of permits. This policy will be continued, in order that no material detrimental in any way will be lawfully permitted to be disposed of in the New York Harbor area.

If you gentlemen have any questions I will be glad to answer them now. I noticed particularly something was said about this this morning.

MR. STEIN: New Jersey.

DR. KANDLE: No questions.

MR. STEIN: New York.

DR. INGRAHAM: No questions.

MR. STEIN: The Interstate Sanitation Commission.

MR. GLENN: No questions.

MR. WUESTERFELD: Thank you very much.

MR. KLASHMAN: Commander Hardy of the Third Coast Guard District asked for the record that we indicate that they had no statement to make and he just wished his presence would be noted. Mr. James Engle of the Bureau of Commercial Fisheries, Department of the Interior. Do you have any statement you wish to make?

STATEMENT OF JAMES ENGLE, FISH AND WILDLIFE SERVICE,
BUREAU OF COMMERCIAL FISHERIES, DEPARTMENT OF THE
INTERIOR

MR. ENGLE: We have no formal statement, but I am certainly in cahoots with all of those who are going to clean up the bay.

MR. KLASHMAN: Thank you, Mr. Engle. Mr. Wechter from the first Army Engineers Office. Do you have a statement to make, Mr. Wechter?

STATEMENT OF WILLIAM WECHTER, SANITARY ENGINEER,
HEADQUARTERS, FIRST ARMY, UNITED STATES ARMY

MR. WECHTER: I would like to make a very simple statement. We in the First Army have been and are very happy and willing to cooperate with all State and local agencies, and do our part in keeping the waters clear according to Section 9 of the Water Pollution Control Act.

MR. KLASHMAN: Thank you very much, Mr. Wechter. Are there any other Federal agencies that have not been called on that are here and wish to make a statement? If not, Mr. Stein, that completes our presentation.

MR. STEIN: We can proceed in alphabetical order now with the agencies represented. I understand that New York may have Mr. Lehman, who is the Administrative Assistant to the Mayor, coming in. Is he here, or will he be here later?

MR. PINEL: I believe he is not here but he will attempt to be here later. It is understood we will be talking later in the afternoon, after the other two organizations have spoken.

MR. STEIN: If it fits his schedule and he comes in before, we may ask the indulgence of the conferees to put him on out of order. I do not think in a proceeding of this kind that makes very much difference. We would like to call now on the Interstate Commission, Mr. Glenn.

MR. GLENN: Our chairman, Commissioner Cope, will speak.

DR. COPE: For the record I am William C. Cope, Chairman of the Interstate Sanitation Commission. I would like to have our counsel, Dr. Wendell, preface this statement I wish to make today, with your permission, Mr. Chairman.

STATEMENT OF DR. MITCHELL WENDELL, COUNSEL, INTERSTATE SANITATION COMMISSION

DR. WENDELL: In order that the scope of the statement to be made here now by the Interstate Sanitation Commission and also by the two States which are going to follow us, may be understood, I think it is desirable that we say a little something about the events leading up to the calling of the conference, and also about the nature of the reports that we heard during the morning session of this conference.

As you know, Chairman Stein, on June 29th there was given the notice of this particular conference. That notice was very brief in character. All it did was to announce the time and place, and to say that it was a conference on all aspects of the pollution of Raritan Bay -- of interstate aspects of pollution of Raritan Bay. Since Raritan Bay is almost 250 square miles in extent, and since "all aspects" covers quite a bit of territory, we, in the preparation for this conference attempted to find out something more as to what exactly was going to be discussed here at this conference. So we inquired of the Surgeon General as to whether he could not be a little bit more informative as to just what was going to be discussed here.

We received a letter signed by Chairman Stein of this conference a couple of weeks back, in which Chairman Stein simply enumerated once again, although in several paragraphs this time rather than the one, that indeed it was all aspects of pollution -- of the Interstate pollution of Raritan Bay that the conference was going to be concerned with. We were assured that we would have an opportunity anywhere from five to two days before the conference met to see at least a draft of the materials that the Public Health Service was going to present here this morning.

I understand that one or two of the participants in this conference, either as conferees or by invitation, had some opportunity very recently to examine a draft which may or may not have been changed in presentation of it here this morning. As for the Interstate Sanitation Commission, we had an appointment for last Thursday morning to talk with the local representatives of the Public Health Service, which, I am sure for very good reason, it was necessary for the Public Health Service representatives to cancel on the explanation that there was further or other business that made it impossible for them to see us. In view of the shortness of time, however, I don't know as the situation really would have been much different if we had had an opportunity to examine the proposed draft statement last Thursday or not.

What has in fact happened is that a statement, very lengthy, very involved, containing much data, in most instances each time computed on a somewhat different sampling basis, and on the basis of different figures, was presented covering a large area, and indeed covering an area much larger even than Raritan Bay. As a result, in all frankness, we must say to this conference that we could not possibly respond in any systematic fashion and comment with any real degree of intelligence concerning many of the things that are contained in that report.

We would have wished that since there was this much time given in advance of the conference by the notice, and that time could have been longer if necessary, that a conference such as this, called to explore and actually to get at the facts -- we would have thought it to be much better procedure if the information that the Public Health Service proposed to use, and from which presumably this conference is supposed to draw some kind of interpretations or conclusions, would have been presented so that the data -- which admittedly in many cases is fragmentary and gathered on one basis one time and on another basis another time -- could have been properly assessed there so that we would all be proceeding on the same agenda and same record, and so that all of us would have known just what the subject for discussion here would be this morning.

As it turns out, the Public Health Service apparently has this information, but we have had much shorter notice concerning it, and so it would not really be possible for us at this stage of the proceedings, and just having heard all of this involved material, to make such a comment. It seems to us as though there are two courses conceivably open at this particular moment. In preparing our statement we have emphasized the things that are presently being done in the Raritan Bay area. We believe that we present as the solid record of accomplishment in this particular area, and what the two States present also will be presenting, shows such a record of accomplishment as would justify the conclusion of this conference at the end of its present stage with the recognition that it is an active program being carried on by two States and an interstate commission together with localities in the area, that is really taking care of the problem in satisfactory shape, and that that program should be permitted to continue.

If this is the conclusion to which this conference comes at the end of the day, or tomorrow if it goes into tomorrow, why then, I don't know that anything more need be said except to hope that in any future conferences, recognizing that this, according to the statute, is supposed to be a stage at which the facts are brought together and the conferees in full knowledge go over them and see what they mean -- we would hope if another time this may be done, that information concerning the nature and exact extent, and materials contained in the proceedings would be made available, so that this could actually be a full conference on what has been presented or what should be presented as the purpose of the statute would indicate.

If, however, that is not the conclusion to which this conference comes, then all we can say is that the nature of our statements here today are necessarily limited in scope. We would have to have an opportunity, after proper study of the statements presented here this morning, to evaluate them and to determine what in the way of comment on them would be most appropriate. I say that because as I understand it we are all here interested, or should be interested in examining the factual situation, which cannot be done on the basis of the complete report compiled on the basis of an admittedly inaccurate, or insufficient at least, set of data on this brief notice.

We hope that what is presented here this afternoon will convince the conferees that a program is already in existence and that its continuance is what is necessary to maintain these waters in good condition. If, however, that should not be the conclusion, as I have indicated here, our response at this time can only be a limited one, for the reasons I have just outlined.

Chairman Cope has the statement of the Interstate Sanitation Commission.

STATEMENT OF INTERSTATE SANITATION COMMISSION
BY WILLIAM C. COPE, CHAIRMAN

DR. COPE: The Interstate Sanitation Commission is an agency of the States of New Jersey, New York and Connecticut, created for the purpose of the abatement and control of water pollution in the Interstate Sanitation District. The waters of the District are roughly coincident with those of the Greater New York Metropolitan Area and include the waters announced as the subject of this conference. We are here today pursuant to a notice under date of June 29, 1961, signed by Arnold B. Kurlander, M. D., Acting Surgeon General.

This conference is a preliminary stage of proceedings under Section 8 of the Federal Water Pollution Control Act. As with all procedures containing several steps, we recognize that the initiation of proceedings does not of itself mean that the subsequent actions authorized by the statute will be pursued. Nevertheless, the intervention of the Public Health Service, even to the extent of summoning this conference, is justified only if there is plausible reason to believe that serious pollution, subject to abatement, is occurring. It is necessary to bear in mind that in the practical administration of our Federal system, and under the terms of the Federal Water Pollution Control Act itself, the States have primary jurisdiction and responsibility for pollution control.

The Act further encourages the formation of interstate compacts for pollution abatement and control, but in spite of this, the Commission was not contacted to determine the necessity of a conference on pollution of Raritan Bay. New York and New Jersey have designated the Interstate Sanitation Commission as their joint agency to deal with the waters here involved. Together with the New York and New Jersey Departments of Health, the Interstate Sanitation Commission has exercised and continues to exercise that jurisdiction in a vigorous fashion.

There are many bodies of water throughout the nation which receive discharges of untreated sewage and other polluting materials in such heavy quantities as seriously to impair their usefulness and safety. If there were any reasonable ground for the technical personnel of the Public Health Service to believe that the waters of Raritan Bay are in such a condition, it would be easier to consider these proceedings as a proper application of the Federal statute. But the waters of Raritan Bay belong to no such class. Surveys by State and city agencies indicate that they are now, and for some time past have been, in very good condition for virtually every use that can be made of them, including those uses requiring a high degree of purity such as fishing and bathing. The only possible use for which Raritan Bay water may be inappropriate is the maintenance of a small shellfish industry. The requisite scientific information to support a conclusion on this point simply does not exist, as there are no quality standards for the treatment of domestic sewage to eliminate hepatitis.

However, even the fate of the Raritan Bay shellfish beds hardly presents the "national interest" that would justify enforcement action by the Public Health Service. Water can be used for many purposes, some of them incompatible. It is reasonable for the people of the region itself to decide whether Raritan Bay should be used for municipal, industrial and recreational purposes requiring the water quality now present or whether they wish to restrict or increase the cost of other water uses to ensure the best possible conditions for shellfish culture. This is not a decision for the Interstate Sanitation Commission to make. It should be made, and is being made, by the two States and the people of the metropolitan area.

While we have found it necessary to express these reservations concerning this conference, we would like to take this opportunity to make certain comments relating to the activities of the Interstate Sanitation Commission and the status of pollution control in the area under discussion. In making these remarks, we should point out that failure to emphasize the work which other agencies of the two State governments and of those who may be here pursuant to their invitation merely reflects the knowledge that these other agencies are making their own statements.

The Raritan Bay area receives the direct discharge of the effluents from the treatment plants in Monmouth and Middlesex Counties of New Jersey, and from Staten Island in New York State.

There are seven plants in New Jersey, and five plants in Staten Island, which serve this area, and these plants range from small septic tanks to large plants. In general, the treatment plants in New Jersey have met the compact requirements of this Commission. There is one plant that has been in violation of compact standards, but the borough, in which this plant is located, is under a court order and has completed plans for correcting the problems within this plant, and should award the contract within a few weeks.

In Staten Island, New York, the small septic tanks along with the discharge of raw sewage from the Tottenville area do not meet the standards of this Commission. However, this area is to be intercepted under the terms of the consent order which the Commission has against the City of New York.

The Arthur Kill joins the Raritan Bay area and there are six domestic sewage treatment plants located throughout its length. These treatment plants intercept the domestic and some industrial wastes, and have an excellent record in meeting the standards of the Interstate Sanitation Commission for Class B waters. The nearest industrial waste to the Raritan Bay area that does not receive treatment is along the Arthur Kill where there is an estimated 100,000 pounds of BOD discharged a day. The domestic waste from these industrial installations is intercepted and sent to existing treatment plants. So this is strictly industrial and is not a source for diseases from bacteria or viruses. Since most of the industries are located along the New Jersey shore, the Interstate Sanitation Commission has cooperated very closely with the New Jersey State Department of Health in working with the industries on this industrial waste problem.

Many industries are conducting surveys of their own and plans are being prepared. Some of these plans have been completed for the initial phase in removing some of these wastes. It should be pointed out that 90 percent of this industrial pollution is north of the Rahway River, so it is rather remote to the Raritan Bay area. It is considered very doubtful, therefore, that the upper portion of the Arthur Kill would exert any effect on the Raritan Bay area.

The waters of the Raritan River were in poor condition and heavily polluted from the mouth up to Bound Brook, New Jersey, approximately 20 miles, until the Middlesex County Sewerage Authority completed its trunk sewer and treatment plant in 1958, at a cost of over $31,000,000. This system intercepts and treats approximately 36 million gallons per day of sewage. This not only brought about a remarkable improvement in the Raritan River for many miles upstream but also improved the quality of the water flowing into Raritan Bay.

In the past ten years, there have been other new plants that have been constructed in the Raritan Bay area. In 1953, Carteret, New Jersey, constructed a plant at approximately four and one-half million dollars, which at the present time intercepts and treats about 1.9 million gallons per day. In 1954, Woodbridge, New Jersey, constructed a plant at a cost of approximately three and one-half million dollars, and removed 2.9 million gallons per day.

Since the Commission is obligated to assure each of the States that the treatment plants within its district are meeting compact requirements, the sampling at treatment plants is one of our activities. The laboratory determinations indicate the effectiveness of the plants and assure that the treatment of wastes meets the standards agreed upon by the three member States. These investigations make it possible to detect plants that have become obsolete or overloaded so that corrective measure may be taken to insure continued compliance with our effluent standards. The Commission cooperates so closely with the States that such action as may be necessary to place waters in such condition as to meet compact standards is sometimes taken under the separate pollution laws of the individual States or the Interstate Sanitation Commission, according to which is the more advantageous.

Water area evaluation surveys are required to determine the effectiveness of the pollution abatement program in different parts of our district. They furnish the information on minimum treatment required to maintain conditions for the best usage of the water. We have been conducting such water area surveys and we selected the more heavily polluted areas for our first studies. In 1957, we made an intensive survey of the Arthur Kill and determined that there was a slug of pollution oscillating back and forth and that portions of the slug sloughed off through the northern end of the Arthur Kill. However, the water that moved out into Raritan Bay was found to meet the dissolved oxygen standards of the Commission.

In the summer of 1958, a study of the Upper Harbor was made, and in 1959, one was made of the East River and out into the Long Island Sound. During the summer of 1960, a combined study of the Upper Harbor, Kill Van Kull, Newark Bay and the upper portion of the Arthur Kill was made. This work is for the purpose of determining the assimilative capacities of the waters of this area. The report of this study has not been completed.

The surveys and study programs of the Commission are now conducted on a regular basis. They are designed to furnish periodic examinations of the several areas within the Interstate Sanitation District.

The Commission has been planning to make a study of the Raritan Bay area during the summer of 1962. Since the Raritan Bay is a wide, open area, it presents problems in sampling not encountered in narrow waterways. The information expected from a proposed Model Study should aid in planning for this study.

The Model Study, mentioned above, is a cooperative effort between the New Jersey State Department of Health, the New York State Water Pollution Control Board, the New York City Department of Health, and this Commission, and would make use of the U. S. Army Corps of Engineers' model in Vicksburg, Mississippi.

For over twenty years, the Commission has had shoreline maps showing all the outfalls throughout the 1,500 miles of the district, and we have an active program continually bringing these outfall maps up-to-date by field men walking the shorelines, not only to detect illegal outfalls, but discharges from regulators which are not working properly.

We submit that this is a strong and active program and that, together with the activities of other States and local agencies in the area, effective control of pollution will continue in Raritan Bay area waters.

Thank you, sir.

MR. STEIN: Mr. Glenn, do you have any further statement?

MR. GLENN: No.

MR. STEIN: New Jersey?

DR. KANDLE: No questions.

MR. STEIN: New York?

DR. INGRAHAM: Nothing.

MR. STEIN: For the record I would like to read the letter that was referred to in the beginning, or at least part of it. I do not think that this is being read out of context. It says:

> "The Government's presentation at the conference is presently being prepared. If you desire to see any of this

material in preparation, this may be done at the Public Health Service Regional Office, Room 1200, 42 Broadway, New York, New York."

It was my information that this office was and is open at all times during business hours. This is the ordinary and usual type of information to be made available by Government offices.

On the second point, as to why the Surgeon General called the conference, I think some of the people who are here were down before the Congress when this law was being prepared by the Congress and enacted by the Congress, and I think they know this law as well as I do. It says:

> "When the Surgeon General on the basis of reports, surveys and studies has reason to believe that any pollution referred to in Section 8 is apparent, that is, pollution from one State which endangers the health or welfare of persons in other States, he shall promptly call a conference."

That is mandatory. You have heard the reports this morning. You have heard Dr. Henderson's report on the infectious hepatitis. You have heard Mr. Clark's report dealing with the state of water development at parks, bathing beaches, pleasure boat marinas, commercial fishing, fish and wildlife, etc. I think that the Surgeon General under the law was doing his duty.

DR. WENDELL: Mr. Chairman, I think you have certainly -- I know you have accurately quoted from the letter informing us that we could examine the materials in preparation. I think though that the record ought to show the date of that letter from you to us. Would you please put that in the record as well.

MR. STEIN: I think we have already put it in.

DR. WENDELL: We have a copy here in our file. Do you have it?

MR. STEIN: No, I do not have it. I thought you had put that in when you said you would.

DR. WENDELL: No. I think we referred to it, but we haven't.

MR. STEIN: I see.

MR. GLENN: This is dated August 8th.

DR. WENDELL: On August 8th. In other words, we received in in our office on the 10th; and for a report of this scope the point I was making was that even at that particular time the maximum we could possibly have had was less than two weeks. We didn't even have that much as it turned out because the appointment we did have, I am sure for good reason, but the appointment we did have was cancelled by the Public Health Service personnel.

MR. STEIN: Did you want to say something, Mr. Martin?

MR. MARTIN: I would like to give an explanation for that. About two weeks after the letter from the Surgeon General went out I called Mr. Glenn and asked him if he would like to discuss with us policies and procedures to be followed at the conference, and what we were doing in preparing the report with the help of Cincinnati, Ohio. Because of some conflicts he had, and because he was going on vacation, the earliest date we could arrange was the week of the 14th of August, and we arranged for a meeting on the 17th of August. I had to be in Toronto on the 15th and 16th, and Mr. Glenn was not getting back until that time. When I was in Toronto I was delayed in getting a plane back, and I called my secretary and asked her on the 16th to advise Mr. Glenn that I couldn't make it on the 17th, and I would be available all day the 18th, but unfortunately on Friday Mr. Glenn was busy and had commitments all day long, and we were not able to get together.

MR. KLASHMAN: Mr. Glenn, I believe I spoke to you also. As a matter of fact, I believe I spoke to each of the technical people representing the agencies here, and indicated that you were perfectly welcome to come to our office and see what we were doing at any time in the preparation of the report.

MR. GLENN: That is right, and you said it would be ready about the 17th or 18th.

MR. KLASHMAN: Correct, but I also said you could come up and see what we were doing as we were going along. The New York Health Department did take advantage of this, and several people from the Department came up. I believe I indicated this to you, Mr. Fletcher, and to you, Mr. Mincher, that it was available, and I think I mentioned it to you too, Mr. Dappert. That is all.

DR. WENDELL: We would not have had an opportunity to see the report in the form as here presented.

MR. KLASHMAN: That is correct.

DR. WENDELL: Until, at the very earliest, the end of last week.

MR. KLASHMAN: That is correct, but the point I want to make is, we tried to make everything we were doing available to whoever wanted to look at it, because we were not working behind closed doors, but working in the open. As a matter of fact, as I said, the New York City Health Department came up and actually read the draft of the report before it had even been prepared in final form.

MR. STEIN: If there are no further comments we would like to call on New Jersey.

STATEMENT OF DR. ROSCOE P. KANDLE, M.D., COMMISSIONER OF THE NEW JERSEY STATE DEPARTMENT OF HEALTH

DR. KANDLE: I am going to go through this report not exactly verbatim, and I will try to indicate the parts which I am omitting, but I have submitted, Mr. Stein, copies for the record of the entire report.

It is the understanding of the State of New Jersey that this conference is called under the provisions of Section 8 of the Water Pollution Act. We presume that the basic purpose is to help maintain the Raritan Bay and its associated waters in a state whereby it can serve the people best, and in this context to seek scientific and practical ways of prevention and abatement of possible pollution of these waters. In an open body of water serving a great many purposes the term pollution is a relative one.

The conference is concerned with a major ecological problem. In its simplest terms it must deal with a vital body of water, the Raritan Bay, some eight miles long and two to three miles across, associated closely with Lower Bay, the Sandy Hook Bay and, of course, with the tributaries, and with the relationship of these bodies of water to many millions of people in a crucially important industrial complex. Disease control is an old and essential dimension, now reemphasized by all the complexities of the transmission of viral infections. The Raritan Bay serves many functions exquisitely related to the total biology and economy of the area, and to the well-being and culture of the people of this vast metropolitan area, as well as the nation and the world. The Bay serves international shipping, local and interstate water transportation and a vast amount of recreational boating. It supports heavy industry by supplying water and helping to dispose of its wastes. It supports the economy of the whole State, metropolitan area through its biological functions of marine ecology including fishing and shellfishing, and support of wildlife. Its recreational uses are manifold and vital. Such complex problems present a wide range of value systems, of appraisal of results of any action on all the dimensions involved, and of many, sometimes almost incompatible standards. These issues require the best of scientific study and practical broad-scale planning and fiscal responsibility. Whether the conference method is the best technique to deal with these problems is an issue also to be considered.

New Jersey, New York State and New York City have been working assiduously on the improvement of the Raritan Bay for years and the record is creditable. These efforts have indeed been assisted, coordinated and reinforced by the 26-year-old, effective and experienced Interstate Sanitation Commission. The Commissioners of Health of all three States serve on the Commission. This system of interlocking responsibility and cooperative study and action results in constant pressures to achieve the prevention and abatement of pollution. There is deep concern. There is no complacency.

One index of status of the Bay is its extensive use for bathing. Surveillance of bathing waters is a regular, continuing function of the New Jersey State Health Department. Regular sanitary surveys and tidal cycle samples have demonstrated the safety and appropriateness of these waters for bathing consistently over the past several years.

On the other hand, the issue of hepatitis stressed at this conference now raises a number of new issues which only careful, broad, ecological study can resolve or even reliably correlate with current standards and concepts about pollution. It must be clearly recognized first that this recent outbreak was related primarily to a huge nation-wide outbreak and that the whole population and its personal environment as well as its bodies of water have had an exposure to this virus not experienced previously for many years. Secondly, scientific data concerning the control of viruses in sewage are urgently needed. Thirdly, the relationships and complexities of the biology of the clams and of these viruses are not yet adequately explored. The experience with hepatitis this year suggests to us that there may have been fundamental aspects of the biology of the clam and its relationship to temperature and other environmental factors not previously appreciated. Fourthly, the foodborne outbreak which was connected with the Raritan Bay was dealt with promptly and effectively by New Jersey and New York using the classical public health methods. The Bay was closed and is now being reopened for shellfishing as data of the safety of this practice are available.

Another basic issue which requires consideration on a generic basis with respect to the Raritan Bay is the Arthur Kill. This body of water now classified as Class B requires further study, particularly with respect to its influence on the Raritan Bay. The commendable work of the Interstate Sanitation Commission is the basis for much of the knowledge of this body of water. Data have indicated that the Arthur Kill is not a major contributor of pollution to the Raritan Bay, but that it discharges primarily northward.

This basic assumption has determined policy and actions by all the agencies concerned. The further testing of this assumption, and the measurement of the current effect on the Raritan are difficult scientific problems in which we might all appropriately join forces. It cannot be settled at this meeting. We do not believe that the issues of the potential sources of pollution in the Arthur Kill can be dealt with individually with respect to any major change of standards until the basic decisions about the Arthur Kill are made.

There are 24 major sources of potential pollution of the Raritan Bay area. Twenty are municipal or industrial, four are military. The arithmetic of volume puts the problems in perspective. Some 45 million gallons per day of treated effluent is discharged into the Raritan Bay directly from eight treatment plants. Of this 45 million, 40 million gallons per day originates with the Middlesex County Sewerage Authority. All except one small Federal installation chlorinate the effluent. About one million gallons per day of chlorinated effluents is discharged into the Bay through various tributaries. Approximately 9 million gallons per day of chlorinated and unchlorinated industrial and sanitary wastes are discharged into the Arthur Kill, but as previously stated there are few data which indicate that these effluents have an appreciable effect on the quality of the Raritan Bay.

Evidence from sanitary surveys, laboratory and fish life, indicates that the previous pollution of the Raritan River has been removed to the extent that the Raritan River per se does not now pollute the Raritan Bay. Indeed, the River is being stocked with shad. All of the complex issues of water use, water volume and disposal of industrial wastes have not yet been solved for the River itself, but the fact that it no longer pollutes the Bay and is making a good recovery as a multiple-use river is encouraging.

I direct your attention now to the statement of the Middlesex County Authority. I move to that statement for the Middlesex County Sewerage Authority, which is appended as part of this statement.

The Middlesex County Sewerage Authority was created by the Board of Chosen Freeholders of Middlesex County in August 1950. The reason for its creation was the intolerable condition of pollution existing in the waters within its district and its specific task was to find a solution to this problem. Among other analyses the valley's waters had been termed by the Surgeon General of the United States as "among the most polluted in the nation." A solution was planned, prosecuted vigorously and on January 14, 1958, became a reality.

The Middlesex County Sewerage Authority is a separate corporate entity, a body politic with perpetual succession as a governmental instrumentality for the purpose, among others, of the protection of the public safety, health and welfare, with power to sue and be sued, to adopt and use a corporate seal, to borrow money or contract debt, to issue negotiable bonds, and to provide for the rights of the holders thereof, and with the right, power and authority to acquire, use and hold and dispose of all property, real and personal, and to make and perform all contracts and do all acts and things and with all other powers proper or necessary to design, finance, construct, acquire and operate such a system of trunk, intercepting and outlet sewers, pumping stations, treatment plants and other plants, and construct as in its judgment will provide the most effectual and advantageous plan or method for relieving any river, its tributaries and other streams, within its sewer district, from pollution and for preventing pollution of the same.

The objectives of the Authority have been to collect sewage and industrial wastes; to eliminate pollution in the Raritan River, South River, and their tributaries; and to treat this mixture of sewage and industrial waste so that the effluent meets the New Jersey Department of Health and the Interstate Sanitation Commission standards for disposal into the Class A waters of Raritan Bay.

The Middlesex County Sewerage Authority has collected and treated many millions of gallons of sewage and industrial wastes since we went into operation from the following municipalities and industries whose estimated 1961 flows are indicated below.

Participant	M.G.D.-Estimated 1961 Flow
Borough of Bound Brook	1.00
Borough of South Bound Brook	0.37
Borough of Middlesex	1.32
Plainfield Joint Meeting (Made up of) Borough of North Plainfield City of Plainfield Borough of Dunellen	6.70
Borough of Highland Park	1.60
The Township of Piscataway	0.24
South Plainfield	0.45
The Township of Edison	4.10
Borough of Metuchen	2.00
City of New Brunswick	9.09
Township of North Brunswick	2.09
Borough of South River	1.14
Borough of Sayreville	1.01
The Township of Madison	0.65
Union Carbide Plastics Co. (Bakelite)	0.46
Benzol Products Co.	0.28
Heyden-Newport Chemical Co.	0.66
Anheuser-Busch, Inc.	0.33
Peter J. Schweitzer, Inc.	4.40
Hercules Powder Co.	1.53
National Lead Company	0.48
Catalin Corporation of America	0.08
TOTAL	39.52 M.G.D.

There are still small amounts of pollution being discharged to the Raritan, South River and their tributaries, but the Middlesex County Sewerage Authority in cooperation with the New Jersey State Department of Health and the Fish and Wild Life Division of the Department of Conservation and Economic Development are actively and aggressively searching for pollutors and requiring that they cease pollution, generally by discharging their wastes to the Middlesex Sewerage Authority.

We wish to emphasize that the Authority will have spent from 1958 through 1961 approximately $857,000 for chlorine to assure that the plant effluent always meets the requirements of the Interstate Sanitation Commission and the New Jersey Department of Health for coliform kill. This chlorine cost averages approximately 20 percent of the operating budget. The Authority has one man on duty 24 hours a day, 365 days a year, whose chief duty is to take a chlorine residual every half hour and to adjust the chlorine feed, if required, to maintain a constant residual which will give the required coliform kill. This additional cost of labor brings the total expenditure since 1958 to almost one million dollars for this phase alone.

Herewith follows two graphs showing monthly coliform results and monthly suspended solids removal. In addition, a composite table of plant results for 1960, by month, with yearly averages for 1958 and 1959.

(The graph referred to, entitled "Graph of Coliform Analyses," was marked for identification New Jersey Exhibit No. 1.)

(The table referred to, entitled "Summary of Operating Results - 1960," was marked for identification New Jersey Exhibit No. 2.)

(The graph referred to, entitled at the bottom "Graph of suspended solids removal," was marked for identification New Jersey Exhibit No. 3.)

DR. KANDLE: The bacterial quality of the effluent has consistently complied with the requirement of the New Jersey State Department of Health, in that at least eighty percent of the samples tested shall show a coliform density of 0.2 coliform organisms or less per milliliter. During the greater part of the year, the established chlorination procedure resulted in over ninety percent of the samples being under the specified coliform density. It would therefore be possible to reduce the chlorination and still meet standards. However, the amount of chlorine which could be saved in this way is deemed insignificant and the Authority considered it preferable to maintain a margin of safety.

Since the beginning of operation in 1958 through June of 1961, the Middlesex County Sewerage Authority has barged to sea 733,000 wet tons of sludge.

It is the purpose of this Authority at all times to cooperate with all the regulatory agencies. The Middlesex County Sewerage Authority in cooperation with the New Jersey Department of Health have spent much time each year since 1957 making surveys on the Raritan, South River and in the Raritan Bay.

The Middlesex County Sewerage Authority proposes to continue to be vigilant in seeking out anyone responsible for polluting the Raritan and South Rivers and to see that they cease pollution. Since we have begun operation a number of new participants have joined this authority, which means elimination of additional pollution. The Township of Franklin has signed a contract within the last few months. The Boroughs of South Brunswick, Spotswood and Monroe Township are in the process of negotiating contracts.

The Commissioners and staff of this Authority have dedicated themselves to the clean-up of the River and its tributaries in our district. The results indicate this is being accomplished.

We propose to carry out to its fruition the policy and program to protect public health, safety and welfare as originally established by this Authority in 1950.

I would like to move back now to Page 4 of the Commissioners' of the New Jersey State Department of Health statement.

Four municipalities along the southern border which require improvements in the treatment facilities are under order by both the New Jersey State Department of Health and the courts and are moving to correct their inadequate conditions.

I direct your attention now to the last part of this report, which is the report of Commissioner Adams. Commissioner Adams is sitting here, but to show the way we operate, we will have the conferee read the report.

Following is document entitled

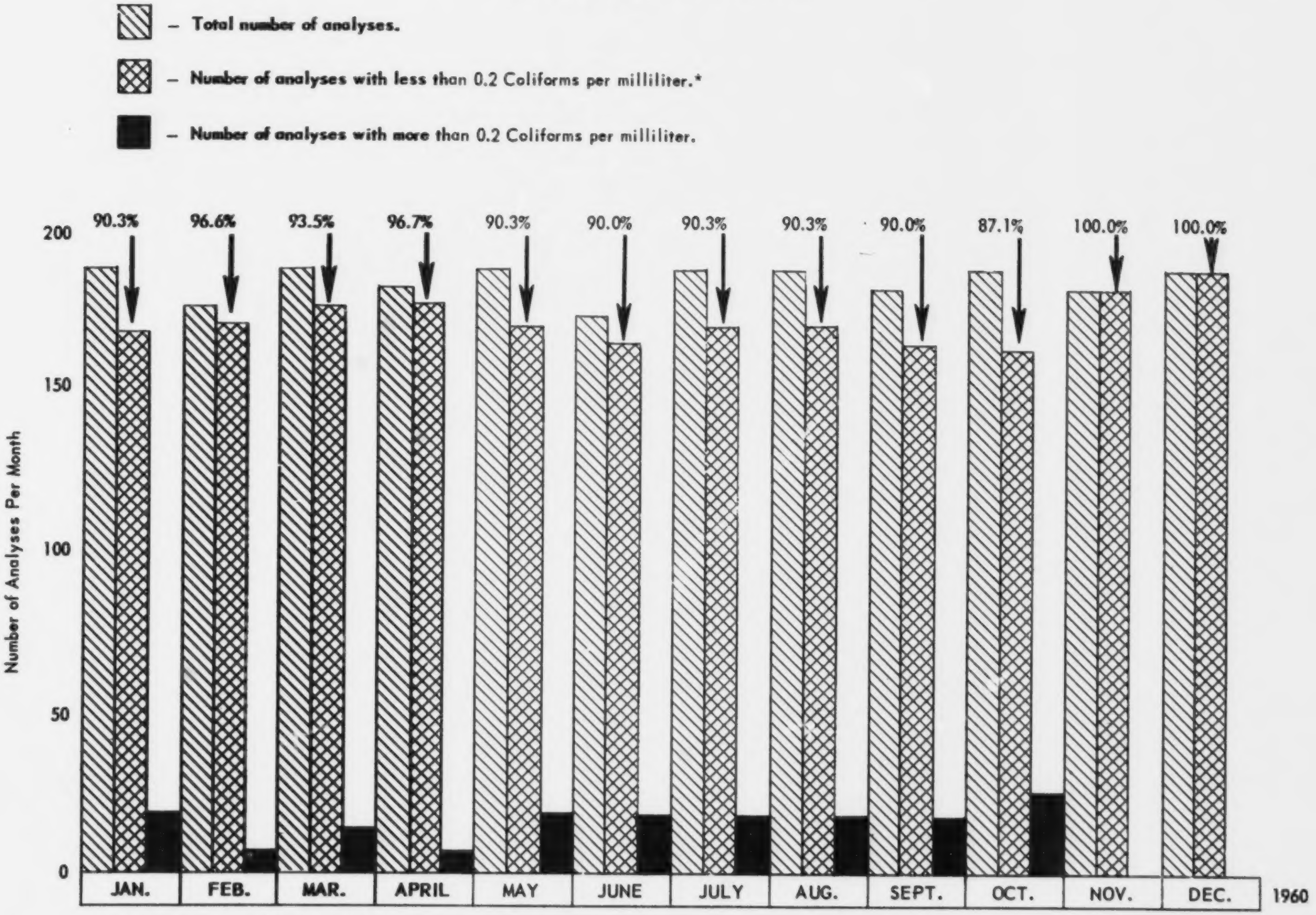
"STATEMENT BY H. MAT ADAMS, COMMISSIONER, NEW JERSEY DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT, BEFORE THE UNITED STATES PUBLIC HEALTH SERVICE HEARING ON RARITAN BAY, NEW YORK CITY, NEW YORK, 22-23 AUGUST 1961"

as read by Dr. Kandle:

"Your invitation to Dr. Kandle, Commissioner of New Jersey's Health Department, to participate in these hearings permits me to illustrate a procedure of which we in New Jersey are extremely proud. The complexities of government in this, the most densely populated State in the Union, are such that the right hand must always know what the left is doing. In all phases of State government, we seek to coordinate diverse interests and programs. While State responsibility for pollution control and abatement rests primarily with the Department of Health, there are many aspects of the problem which come within the scope of the Department of Conservation and Economic Development. For many years these two departments have been combining their efforts and talents, so Dr. Kandle's request that I present a statement here may be considered S.O.P. for New Jersey.

"Many varied functions of the Department of Conservation and Economic Development integrate in Raritan Bay. The Division of State and Regional Planning is vitally concerned with both the industrial and the recreational development of this great estuary. Its wise use and development figure materially in our State plans. The Division of Water Policy and Supply is currently engaged in a gigantic project to develop the water resources of the

GRAPH OF COLIFORM ANALYSES



* State Department of Health of New Jersey requires 0.2 Coliforms or less in 80.0% of samples.

New Jersey Ex. 1.

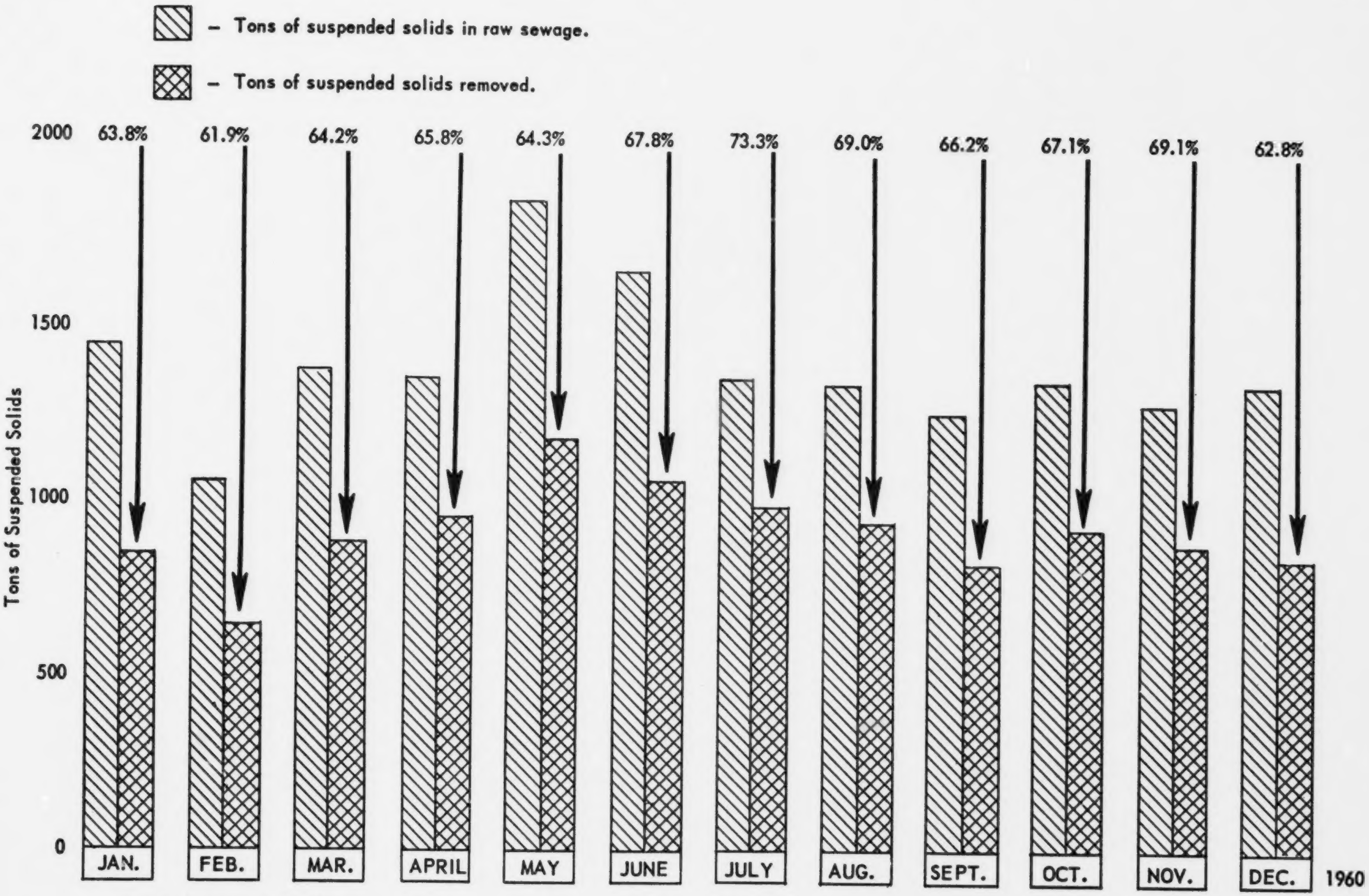
74-a

SUMMARY OF OPERATING RESULTS - 1960

		CHLORINATION					B. O. D.		SUSPENDED SOLIDS			SETTLEABLE SOLIDS			SLUDGE HANDLING					
		Chlorine Applied Avg.													From Clarifiers To Thickeners		From Thickeners To Storage		From Storage To Barge	
MONTH 1960	Average Daily Flow M. G.	1000 lb. M.	P.P.M.	Residual P.P.M. Avg.	Coliform Bacteria % of Samples Less Than 0.2/ml.	Inf. P.P.M. Avg.	Eff. P.P.M. Avg.	Reduction %	Inf. P.P.M. Avg.	Eff. P.P.M. Avg.	Reduction %	Inf. M 1/1 Avg.	Eff. M1/1 Avg.	Reduction %	1000 Cu. Ft. Per Day, Avg.	% Solids Avg.	1000 Cu. Ft. Per Day, Avg.	% Solids Avg.	Wet Tons Per Month	Solids Avg. %
Jan.	41.68	12.8	38	0.72	90	414	354	14	276	100	64	13.7	0.2	99	286	0.60	17.7	6.0	25134	6.6
Feb.	39.37	12.3	39	0.69	97	433	371	15	259	99	62	12.2	0.2	98	317	0.60	15.4	6.6	9389	6.3
Mar.	34.43	11.3	39	0.70	94	478	396	17	315	111	65	12.8	0.1	99	308	0.55	18.5	5.5	20676	7.2
Apr.	39.63	11.7	37	0.68	97	420	365	13	311	103	67	12.7	0.2	98	319	0.47	18.6	6.9	16900	4.4
May	42.32	12.7	36	0.72	90	460	363	21	339	120	64	15.2	1.0	93	279	0.61	19.0	6.6	22518	4.8
June	41.10	15.3	45	0.70	90	423	352	17	321	104	68	15.9	0.2	99	303	0.98	21.3	6.6	20335	6.2
July	39.59	14.7	45	0.74	90	388	326	16	259	68	74	11.1	0.1	99	246	0.54	19.1	6.7	19837	6.3
Aug.	41.71	16.9	49	0.75	90	362	322	11	250	77	69	11.8	0.1	99	242	0.44	18.9	5.7	27574	5.9
Sept.	46.56	16.3	45	0.70	90	330	289	12	219	76	65	10.5	0.1	99	268	0.43	20.2	6.2	16034	4.9
Oct.	39.41	13.3	40	0.70	87	430	384	11	262	86	67	13.0	0.1	99	268	0.41	21.4	5.4	21218	3.9
Nov.	40.56	12.5	37	0.70	100	420	360	14	260	82	69	12.8	0.1	99	266	0.53	20.0	6.0	20223	4.7
Dec.	40.39	13.5	41	0.70	100	422	368	13	279	105	62	12.6	0.1	99	279	0.59	20.3	6.0	20400	4.9
Average	40.56	13.6	41	0.71	93	415	354	14	279	94	66	12.8	0.2	98	281	0.56	19.2	6.2	20020	5.5
1959 Average	37.26	16.4	54	0.74	96	449	364	19	316	102	68	15.2	0.2	98	299	0.60	18.4	5.8	18989	4.8
1958 Averages May 1st To Dec. 31st ..	35.19	15.9	55	2.30	91	447	382	14	285	82	71	16.4	0.3	98	259	0.68	16.8	6.4	15282	4.7

74-b

New Jersey Ex. 2.



Graph of suspended solids removal.

74-D

New Jersey Ex. 3.

Raritan River basin. Fresh, usable water is the backbone of sound development. The elimination of flood danger is equally important. Our Division of Shell Fisheries is concerned with the preservation of our great clam and oyster resource and its annual contribution to both our food and our economy. Our Division of Resource Development, through its Bureau of Navigation and Bureau of Parks and Recreation, recognizes this Bay as a water course and playground vital to the State and the whole metropolitan area. In addition, it is the center of a region of great industrial development. The Division of Fish and Game, too, has much concern for this body of water. In fall and winter, it is the home of hundreds of thousands of migratory waterfowl. It supports one of the most intensive sport fisheries in the world, and the harvest of menhaden and food fishes represents a multi-million-dollar business. Our position has been and still is that no type of pollution can be permitted to detract from the value of these waters.

"The Division of Fish and Game is charged by law with the prosecution of anyone who discharges wastes or other substances into the waters of the State in quantities that kill fish or wildlife or destroy their habitat. From time to time in the Bay, it has been necessary to take action under this law. In recent years, all such cases have been caused by accident or carelessness, and the offenders have been industrial concerns. With continued vigilance, we are confident that this type of pollution can be prevented from harming the great fish and wildlife resources of the Bay. Continuing studies by this Division show no evidence of the destruction of fish or wildlife values in the Bay. It is one of our most productive and fertile estuaries.

"In certain parts of the Bay, shellfish have been found unsafe for human consumption. We are currently working with the Department of Health and other authorities to pinpoint the source of this contamination and to take steps to eliminate it. We are determined to preserve the clam and oyster resources of this bay which have been justly famous since colonial times.

"We are also concerned that the trunk sewer concept be applied wisely. Under certain circumstances, this is the only practical approach to pollution abatement. This was the case in the lower Raritan basin. However, water in its natural channels can be used and reused for industry, recreation, and a host of other purposes. A river flowing through sewer pipes has lost its usefulness.

"Raritan Bay and the Raritan River Basin are vital to New Jersey in a multitude of ways. We do not intend to permit pollution to jeopardize these values. There are certain problems in the disposal of both industrial and domestic wastes which must be solved, but we believe we are on the way to solving them. We recognize that pollution abatement here as elsewhere is more than a health problem. We intend to see that this great body of water continues to serve our citizens in all ways unhindered by careless disposal of wastes."

I move now to Page 5 of the Commissioner's of the New Jersey State Department of Health report.

New Jersey suggests that this conference could properly conclude that:

(1) There is experienced, effective machinery to deal with prevention and abatement of pollution of the Raritan Bay.

(2) There has been and continues to be clear progress, under plan, and under the surveillance of a variety of agencies and forces relating to health, conservation and the economy of the area.

(3) That scientific data taking into account a wide range of factors and technological problems, including health, conservation, water policy and uses and industrial processes are urgently needed, and are the critical issue in further control of pollution in the Raritan Bay.

(4) The Conferees welcome and appreciate the interest, support and collaboration of the Public Health Service in the collective efforts to preserve the Raritan Bay and particularly in solving the scientific problems.

(5) The Conferees are willing to report to the Public Health Service at appropriate intervals.

Now may I just say, Mr. Chairman, one or two things about the data this morning.

I fully appreciate the cooperation we got from your office, and certainly the cooperation we got from the district office. We had many telephone calls and the fullest cooperation in sharing the data which were available, but I agree with Dr. Mitchell Wendell that being faced with a report such as we had this morning puts us at a considerable disadvantage, since these were data selected out. To try to deal with them in the context of our own data and the overall situation is very difficult.

I point out one or two things and I point these out as examples and not to try to get at the report, because we can't deal with that. But Mr. Clark picked out two bits of bacteriological data from the Rand Report. This report is quite a document and the report itself seemed to me to come to a conclusion different from that which I interpreted Mr. Clark's data as.

I merely cite this as an example of where a batch of data picked out of the report, which is very basic because it deals with the degree to which the Middlesex Authority cleaned up the Raritan and its effect on the Raritan Bay. Also I would like to reiterate the data which were used with respect to the shellfish waters, because while I am not quarreling with the data per se I do not think they reliably measure the situation with regard to the shellfish waters.

There are very extensive data from both of the regulatory agencies in which this picture is pretty clearly portrayed, and it is difficult to deal with one little fact or limited data from two stations. Actually there are about fifty stations, or something of that sort, about which there are continuous data running over a good many years.

Also, as another example, we find it hard to deal with Chart 5. That is the chart which points out data relative to the status of the plants. Those comments about which are overloaded and the degree of suspended solids of B.O.D. and so forth, are really much more complex than one can get at.

I respect Mr. Clark and his conferees' opinions, but we might not come to the same conclusion even from the same data, looking at the same data -- and I am sure we all would be looking at the same data since most of it came from the records of the conferees.

MR. STEIN: Thank you, sir. Does New York have any comments or questions of the New Jersey State Commission?

DR. INGRAHAM: No.

MR. STEIN: Mr. Klashman?

MR. KLASHMAN: I have no questions.

MR. STEIN: Thank you. May we at this point call on New York. Do you have anything else first, Dr. Kandle?

DR. KANDLE: No.

MR. STEIN: Dr. Ingraham.

STATEMENT OF NEW YORK STATE DEPARTMENT OF HEALTH, ON BEHALF OF HERMAN E. HILLEBOE, M.D., COMMISSIONER OF HEALTH, PRESENTED BY DR. HOLLIS INGRAHAM, FIRST DEPUTY COMMISSIONER OF HEALTH, NEW YORK STATE

DR. INGRAHAM: I want to read a statement on behalf of Dr. Herman E. Hilleboe, Commissioner of Health of the New York State Department of Health.

This meeting is concerned primarily with the pollution of Raritan Bay and particularly with the effect of such pollution on shellfish which are grown in the bay. This particular problem, however, is one part of the total complex problem involving pollution of waters within the whole New York Metropolitan Area.

The State Department of Health has been much concerned with these problems. More than 25 years ago the Department worked closely with many persons and agencies in developing what later became the Interstate Compact for control of pollution in the tidal waters of the New York Metropolitan Area. Since the creation of the Interstate Sanitation Commission, the State Commissioner of Health has served as a member of such Commission.

The State Commissioner of Health has also served as Chairman of the New York State Water Pollution Control Board, which has specific responsibilities in relation to these problems.

The Water Pollution Control Board will cease to exist on January 1, 1962. Its present functions and duties will be divided between the State Commissioner of Health and the Water Resources Commission of the New York State Conservation Department, of which he is a member. The Water Resources Commission will have the authority for classifying waters and establishing standards. The State Commissioner of Health will assume the duties of enforcing the law and bringing existing pollutional discharges into compliance with the established standards.

Over the years, much progress has been made in the abatement of pollution within the Interstate Sanitation District. New York City has been engaged on a progressive, excellently engineered program for many years. The accomplishments have been noteworthy and this progress is continuing toward completion of the city's presently planned pollution abatement program within the next few years. However, some problems of great magnitude will still remain. Most of the area is plagued with the problems of so-called "marginal" pollution.

The major sources of this "marginal" pollution are the numerous combined sewer relief overflows which occur during rains and spill a mixture of sewage and storm water into the adjacent waterways.

Most of the sewers in the various boroughs of the city have been built on the combined plan -- designed to handle both sanitary sewage and storm water. The city's program of pollution abatement has provided for construction of many intercepting sewers and sewage treatment plants. The interceptors pick up from two to two and a half times the dry-weather flows and deliver these to the treatment plants for treatment. During rains the flows in excess of interceptor capacities are discharged without treatment through numerous relief overflows. When the city has completed all of its presently planned program, it is estimated that from 3 to 5 percent of all sewage produced within the city will continue to be discharged into the various waterways through these relief outlets.

The city has given much consideration to ways and means of reducing this so-called "marginal" pollution and has had engineering studies made in relation to the problem as it affects certain areas in the Upper East River and Jamaica Bay.

We have not determined to what extent this "marginal" pollution is involved with the pollution of Raritan Bay. However, the New York City Department of Public Works and the Interstate Sanitation Commission have detailed information as to sources of pollution throughout the area, and would be competent to make some appraisal as to how important "marginal" pollution is in relation to the quality of water in Raritan Bay.

In this presentation no attempt will be made to present any inventory of the various sources of pollution affecting Raritan Bay. The City Department of Public Works and the Interstate Sanitation Commission are the base source for this kind of detailed information. They can provide information concerning the status of the various existing and planned pollution abatement works.

There are, however, some other matters of importance which should be reported to this conference.

The Interstate Sanitation Commission, New York City, State of New Jersey, and the New York State Water Pollution Control Board have cooperated in the financing of a study of the patterns of flow and the other factors, in the waters of New York City. This will be carried out by the Corps of Engineers using the New York Harbor model located at Vicksburg, Mississippi. It is expected that this study will get under way this month. It is the consensus of all the participating agencies that the results of this study will be of great value in appraising the travel and other effects of pollution discharged at any specific point on any waters of the area. The results will undoubtedly be of value in the Raritan Bay problem.

The Water Pollution Control Board is presently engaged in work that will lead to classification and assignment of quality standards for all waters within the City of New York. Engineering studies for classification purposes have been made of several drainage basins within the city. These are the Arthur Kill and Kill Van Kull, West Lower Bay and Raritan Bay, Upper Bay and East Lower Bay, Hudson River below Westchester-Rockland County Lines, Harlem River, Lower East River, Atlantic Ocean opposite New York City. The reports on these studies have been drafted. Some are now being printed and the others will soon be offered for printing.

After printed copies of these reports become available, public hearings as required by law will be arranged preliminary to adoption of official classifications and assignment of quality standards.

In classifying these waters, all of which are within the area of the Interstate Sanitation District, the standards as assigned by the Water Pollution Control Board or the Water Resources Commission, after January 1962, will have to be compatible with the classes and standards of the Interstate Sanitation Commission. They may be higher, but cannot be lower than the Interstate Sanitation Commission standards.

It seems probable that some special classes will need to be developed for application to these waters which will be compatible and consistent with the present Interstate Sanitation Commission standards and which will be capable of being attained. It is fairly apparent now that in some areas the dissolved oxygen requirement of "not less than 5 parts per million" as applicable to the presently established Water Pollution Control Board Classes SA, SB and SC, cannot be achieved even when the city's presently planned pollution abatement program is completed. Hence, some special classes will need to be established relative to the dissolved oxygen standard. It is probable, therefore, that when the classification hearings are held, the matter of special classes will also be considered.

The classification studies and report covering West Lower Bay and Raritan Bay and their tributaries were made by Mr. H. F. Udell of the New York State Conservation Department, Shellfish Management Unit. This report is in process of being printed. Although published copies are not yet available, some of the highlights are presented as follows.

The areas covered by the studies include that portion of Lower Bay west of a line extending southeasterly from the northeast end of South Beach at Fort Wadsworth Government Reservation through West Bank Light to the New York State Boundary; north of the New York-New Jersey State Boundary line through Lower Bay and Raritan Bay; and that part of Raritan Bay north and east of the State boundary line at the westerly extremity of Raritan Bay and the Arthur Kill.

Raritan Bay may be considered to be that body of water west of a line drawn from Crookes Point at Great Kills, Staten Island, southerly to Point Comfort at Keansburg, New Jersey. The Bay is triangular in shape and Raritan River and Arthur Kill discharge at its apex. Lower Bay lies between Staten Island and the New Jersey shore, east of Raritan Bay and west of Ambrose Channel.

The report makes reference to past studies carried on during 1909-1912, 1927-28, 1937-38, 1940-41, 1951 and 1952. In general, the conclusions reached by the authors of these reports indicated that discharge of domestic and industrial wastes into watercourses tributary to Raritan Bay resulted in excessive pollution into these waters.

For purposes of water classification, the bays were divided into three areas, delineated as follows:

Area I (S.I. 1) is Lower Bay adjacent to the shores of Staten Island from Wadsworth Point westerly to Crookes Point.

Area II (S.I. 2) is that part of Raritan Bay adjacent to the shores of Staten Island from Crookes Point westerly to Red Bank.

Area III (S.I. 3) is that part of Raritan Bay from Red Bank to Tottenville.

The drainage area of Staten Island adjacent to the Raritan and Lower Bays comprises about 18.5 square miles. No large streams drain into these bays between Fort Wadsworth at the Narrows and Ward Point at Tottenville. However, there are two small embayments which receive some drainage from marsh areas and which are also used as boat basins -- known as Great Kills and Princess Bay. Lemon Creek discharges into Princess Bay.

The area from Wadsworth Point to Crookes Point (designated as S.I. 1) is residential. The shore section of this area is being developed by the New York City Department of Parks for bathing and recreation. It is expected that undeveloped land adjacent to the proposed recreational area will be utilized for housing in the immediate future. A sewerage system serves the New Dorp Section carrying sewage to Oakwood Beach Sewage Treatment plant. This plant provides secondary type treatment and the effluent discharges through an outfall terminating 2,700 feet offshore in Lower Bay.

Waters from the area extending from Crookes Point to Red Bank (designated as S.I. 2) drain into the area previously open to shellfishing and into areas which would possibly be considered for shellfishing in the future when pollution is further abated. The northeastern part of this area is residential, while the remaining section is wooded with some small industry and institutional facilities which contribute pollution to Bay waters. Lemon Creek is the only sizable stream flowing into the Bay from this area. Its fresh water contribution is small, but polluted. The other small drainage streams carry some incidental pollution from the cesspools in the local area.

From Red Bank to the southwesterly tip of Staten Island the waters drain into that portion of Raritan Bay (designated as S.I. 3). Tottenville is an industrial community of about 9,000 population. Sewage and industrial wastes are discharged untreated into waters of Raritan Bay.

The report points out that the City of New York plans recreational facilities along the entire Staten Island shore and that the city's pollution abatement program is aimed at preventing further pollution of the Bay areas. For these reasons, it is to be expected that the quality of the stream and outfall waters will be improved.

The report contains some discussion of the hydrology of the surface waters of the area and the results of certain float and other studies carried on during past years. One of these developed some correlation between the salinity and the coliform MPN for the Raritan Bay area. It was noted that there appears to be some relationship between salinity and MPN in sections of Raritan Bay along the shipping channels. This would indicate that the large amounts of fresh water entering the Bay are accompanied by pollution.

The float studies have indicated that the net tidal drift is about 1.5 miles. At this rate, it is estimated that it would take at least four days for a slug of pollution from Great Beds Light to flow past a north-south line through Crookes Point, Staten Island, and Point Comfort, on the New Jersey shore. Proceeding easterly into Lower Bay, the net seaward drift decreases.

The northern section of Lower Bay has a rotary type tidal pattern causing the water to follow a clockwise pattern. Float studies indicate that water flowing past Fort Wadsworth through the Narrows on an ebbing tide reach West Bank Light and then circle west and north towards South Beach.

The results of a bacteriological study made by the New York State Conservation Department Shellfisheries Management Unit in May 1955 are discussed. These showed the Raritan River to be the major source of pollution in Raritan Bay. Although raw sewage from Tottenville is discharged into the Arthur Kill, this source of pollution was minor when compared with that of the Raritan River.

The report contains a chart on which lines of equal density show the geometric mean of bacterial pollution expressed as most probable numbers in 100 milliliters of sample. The contours indicate the degree of bacterial pollution throughout the area studied. The pollutional influence of Raritan and Hudson Rivers is clearly indicated.

The results of another bacteriological survey during the period March to June 1958, after the Middlesex County Sewage Treatment plant was placed in operation, are discussed in this report. These showed higher bacterial concentrations in New York State waters in 1958 than in 1955, with the exception of Arthur Kill. A definite extension of polluted water toward Princess Bay was indicated by this study.

The report discusses data compiled in May 1960 which indicate an increase in bacterial pollution in both Raritan and Lower Bays during that month.

The report also discusses the results of a chemical study carried on in 1958 with particular reference to dissolved oxygen contents of the water.

The report describes the area previously certified, until recently, for the taking of shellfish for market purposes, in effect since 1941. The report also points out that it had been anticipated that Raritan Bay pollution, resulting from Raritan River flow, would be measurably reduced by the Middlesex County Sewage Treatment Plant and that such reduction would permit enlargement of the present certified area, all of which recently has been closed because of the hepatitis occurrence.

The report states that evaluation of analytical results of recent samples of Bay water collected from Raritan indicates pollutional encroachment on the shellfish area. However, the report points out that more effective sewage treatment and pollution abatement should improve pollution conditions in the present shellfish harvest area, and, accordingly, it suggests that the area, as previously certified by the Conservation Department, be classified so as to recognize this usage.

A list of sources of pollution affecting the waters of Raritan and Lower Bays is presented in the report.

From what has been outlined above, it seems that a fair picture has been developed as to the sources of pollution and their effects on Raritan Bay. The picture implies a need for construction of additional pollution abatement projects to abate pollution caused by continued discharge of untreated sewage from certain areas tributary to the Bay. So far as New York City is concerned, it is our impression that this need is recognized and will be considered in its program. The picture also implies that there may be a need for improved operation of existing sewage treatment plants to the extent at least of obtaining more effective disinfection of present effluents.

However, there would seem to be some areas of the problem in need of more precise evaluation. To what extent will the problem of so-called "marginal" pollution affect the quality of waters in Raritan Bay? To what extent is pollution from boats involved in the pollution of shellfish-rearing areas of Raritan Bay? And assuming a future condition when all untreated sewage still tributary to the Bay is brought under treatment, except perhaps from the so-called "marginal" sources, what are the problems related to viral contamination of these waters? It is known that modern sewage treatment processes are not capable of complete destruction or removal of all viruses from effluents -- they can only effect a reduction.

In the consideration of these and interrelated problems, the State Commissioner of Health assures the Surgeon General that he will cooperate and assist in every possible manner. The problem is of great concern to the people of New York State, and the objective should be to devise a solution if it is practicable and possible to do so. Certainly it will be possible to effect improvements, but whether or not these will be sufficient to permit reopening of certain areas of the Bay to shellfishing is a question. Shellfish beds located so close to a great metropolitan complex, such as that of the New York Metropolitan Area, present a unique problem that in all of its aspects, from a practical and economical standpoint, may be incapable of total solution.

I would like to observe that the United States Public Health Service and the New York State Department of Health have had a long history of cordial and cooperative effort in improving public health in many areas of endeavor. In view of this I cannot help but note that the manner in which this meeting was called, through the newspapers, was not calculated to have a beneficial effect on that relationship.

I would like to say in closing that the State Health Department concurs very largely with the conclusions reached by Dr. Kandle. Since I did quote rather largely from Dr. Udell, I should like to ask him to make a brief statement to complement the remarks I have made.

MR. STEIN: Thank you, sir. That was a very excellent statement. May I say -- and I stand to be corrected on this -- but as a matter of policy the Public Health Service in its long continuing relationships with the States to my knowledge has never sent out a notice on a conference, or any other action in the enforcement field, without first having our field people get in touch with their counterparts at the State agencies, and it is my understanding that this was done in this case; and phone calls were made to New York State by our regional office. Our Bureau Director, I understand, was in touch with Dr. Hilleboe, the head of the New York State Department, and similar calls were made to New Jersey. I know I made one myself to Mr. Mincher and, as I understand it, the regional office did make calls to the Interstate Commission. They did this on our instructions.

As a matter of fact, the conference notice was held up for about a week in order that this could be done, and I am very much disturbed to think that there was any other impression created. If any other impression was given it was inadvertent. It is certainly not the way we like to do business, and it is not our policy.

DR. INGRAHAM: We are very glad to hear that.

MR. STEIN: That is right.

DR. INGRAHAM: I wanted to call to your attention that it was not the policy in the past and we would not like to see it the policy in the future.

MR. STEIN: That is correct.

DR. INGRAHAM: Might I call upon Mr. Udell to supplement the statement?

MR. STEIN: Yes, if you would. Do you want to come up here, Mr. Udell.

STATEMENT OF THE NEW YORK STATE CONSERVATION DEPARTMENT, PRESENTED ON BEHALF OF COMMISSIONER OF CONSERVATION HAROLD WILM, BY HAROLD F. UDELL, NEW YORK STATE CONSERVATION DEPARTMENT, SHELLFISH SANITATION AND MANAGEMENT UNIT, FREEPORT, NEW YORK

MR. UDELL: I would like to read a statement by Dr. Wilm, the Conservation Commissioner, which may be an addition or appendix to the statement just read by the Deputy Commissioner of Health for the New York State Department of Health.

The State of New York Conservation Department sponsors the statement by the State of New York Health Commissioner. We feel that the statement as presented appears to present a true appraisal of the situation. The concluding paragraphs of the statement lead to the following comments:

1. If domestic and industrial waste pollution could be eliminated through full utilization of modern sewage and industrial waste treatment processes, would the quality of waters in Raritan Bay be substantially improved?

2. Would the attained improvement be of sufficient magnitude to permit harvest of shellfish for market purposes from any portion of these waters?

3. Recognizing the complexity of the situation relative to domestic and industrial needs of the New York Metropolitan Area, would abatement of pollution to a level which would permit utilization of natural resources of this area be so difficult as to outbalance the recreational or other personal benefits that might result from such action?

We feel that practical and economic factors affecting solution of the pollution problem not favorable to utilization of natural resources should receive serious consideration before making a final conclusion.

MR. STEIN: Thank you. Do you have anything further?

MR. UDELL: No, sir.

MR. STEIN: Are there any questions of Mr. Udell, or any comments? Dr. Ingraham.

DR. INGRAHAM: I would like now to present a statement from New York City. It is a combined statement from the Department of Public Works and the City Health Department and the Assistant Coordinator of the City, and the statement will be read by Mr. Pinel.

MR. STEIN: Mr. Pinel, we will be happy to hear from you at this time.

STATEMENT OF THE CITY OF NEW YORK, PRESENTED ON BEHALF OF MR. MAXWELL LEHMAN, DEPUTY CITY ADMINISTRATOR, BY STANLEY PINEL, CHIEF ENGINEER, CITY ADMINISTRATOR'S OFFICE, CITY OF NEW YORK

MR. PINEL: Mr. Maxwell Lehman, who is the Deputy City Administrator, sends his regrets. He has lost his voice today. He just broke down. He is very interested in the whole subject of water pollution both from the city standpoint and from that of the metropolitan area. He undertook to coordinate the statement of the several city agencies involved that have already been mentioned, except that besides the Department of Health and the Department of Public Works, they also include the Department of Parks, the Bureau of the Budget, the City Planning Commission, the Board of Estimate and the Borough President's Office of the Borough of Richmond. A combined statement has been developed and a table and map which I believe certainly should be made a part of the record of this proceeding.

MR. STEIN: They will. There is no objection to that, is there?

(Map entitled City of New York, Dept. of Public Works, Plan for Pollution Control, was marked for identification New York City Exhibit No. 1.)

(Graph entitled Staten Island, was marked for identification New York City Exhibit No. 2.)

MR. PINEL: The subject matter of the conference is concerned with pollution of Raritan Bay. However, the City of New York has been concerned with the problems of harbor pollution for many years and has in both long-range planning and current activity progressed steadily toward goals of safeguarding water quality throughout the harbor area lying within the city's boundaries.

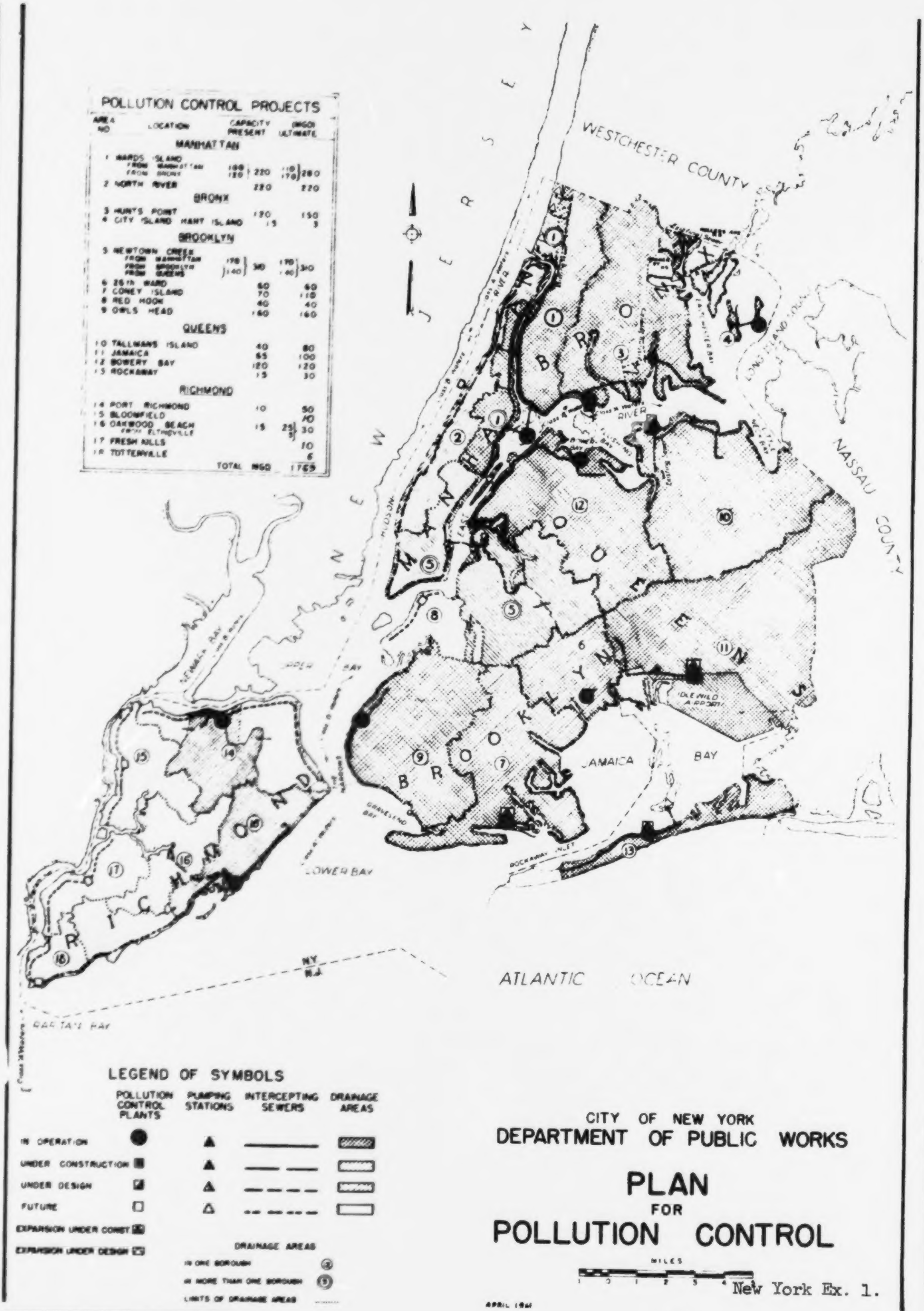
Development of a Protection Program for Raritan Bay Shoreline of Staten Island

In 1914 the Board of Health of the city proscribed bathing in polluted waters in the City of New York. These waters included the Hudson, Harlem and East Rivers, Upper Bay and Jamaica Bay. In the Borough of Richmond the proscribed areas were designated as those along Raritan Bay, Arthur Kill, and Kill Van Kull from Page Avenue east of Tottenville to New Brighton; or along the Upper New York Bay and the Narrows from New Brighton to the northerly boundary of Fort Wadsworth Reservation.

In 1948, the Board of Health issued a declaration of policy relative to the classification and approval of waters for bathing beach purposes. With the exception of South and Graham beaches and a short distance along Midland Beach, all open waters along Raritan Bay shoreline now meet the requirements for approval of waters for bathing beach purposes established under that policy.

The results of averages on samples over an eleven-year period, 1951-1961, show that there has been no adverse change in the quality of the waters, and show further that there have been improvements in water quality in once limited areas extending from Fox Lane southerly to the northeast quarter of Great Kill Beach, and the waters from Holton Avenue easterly to Page Avenue. A chart is appended to the statement showing this.

Raritan Bay is the only source of shellfish (clams) taken from waters in the City of New York. Most of the shellfish offered in New York City comes from waters in other parts of New York State and other States on the eastern seaboard. The New York Raritan Bay area was opened for shellfish digging by the New York City Board of Health and the New York State Conservation Department in March, 1942. Another area in Raritan Bay contiguous to this old area was approved by the New York State Department of Conservation in June 1955, and subsequently by the Board of Health. Samples of the waters


WESTCHESTER COUNTY
NASSAU COUNTY
NEW JERSEY
BRONX
MANHATTAN
QUEENS
BROOKLYN
RICHMOND
HUDSON RIVER
HARLEM RIVER
EAST RIVER
LONG ISLAND SOUND
UPPER BAY
LOWER BAY
JAMAICA BAY
ROCKAWAY INLET
GRAVESEND BAY
IDLEWILD AIRPORT
RARITAN BAY
ATLANTIC OCEAN
NY
NJ
LEGEND OF SYMBOLS
POLLUTION CONTROL PLANTS
PUMPING STATIONS
INTERCEPTING SEWERS
DRAINAGE AREAS
IN OPERATION
UNDER CONSTRUCTION
UNDER DESIGN
FUTURE
EXPANSION UNDER CONST
EXPANSION UNDER DESIGN
DRAINAGE AREAS
IN ONE BOROUGH
IN MORE THAN ONE BOROUGH
LIMITS OF DRAINAGE AREAS
MILES
1 2 3 4

POLLUTION CONTROL PROJECTS

AREA NO	LOCATION	CAPACITY PRESENT	(MGD) ULTIMATE
	MANHATTAN		
1	WARDS ISLAND FROM MANHATTAN FROM BRONX	100 120 } 220	110 170 } 280
2	NORTH RIVER	220	220
	BRONX		
3	HUNTS POINT	170	150
4	CITY ISLAND HART ISLAND	15	3
	BROOKLYN		
5	NEWTOWN CREEK FROM MANHATTAN FROM BROOKLYN FROM QUEENS	170 140 } 310	170 140 } 310
6	26th WARD	60	60
7	CONEY ISLAND	70	110
8	RED HOOK	40	40
9	OWLS HEAD	160	160
	QUEENS		
10	TALLMANS ISLAND	40	80
11	JAMAICA	65	100
12	BOWERY BAY	120	120
13	ROCKAWAY	15	30
	RICHMOND		
14	PORT RICHMOND	10	50
15	BLOOMFIELD		10
16	OAKWOOD BEACH FROM ELTINGVILLE	15	25 5 } 30
17	FRESH KILLS		10
18	TOTTENVILLE		6
		TOTAL MGD	1765

CITY OF NEW YORK
DEPARTMENT OF PUBLIC WORKS

PLAN
FOR
POLLUTION CONTROL

APRIL 1941

New York Ex. 1.

86-A

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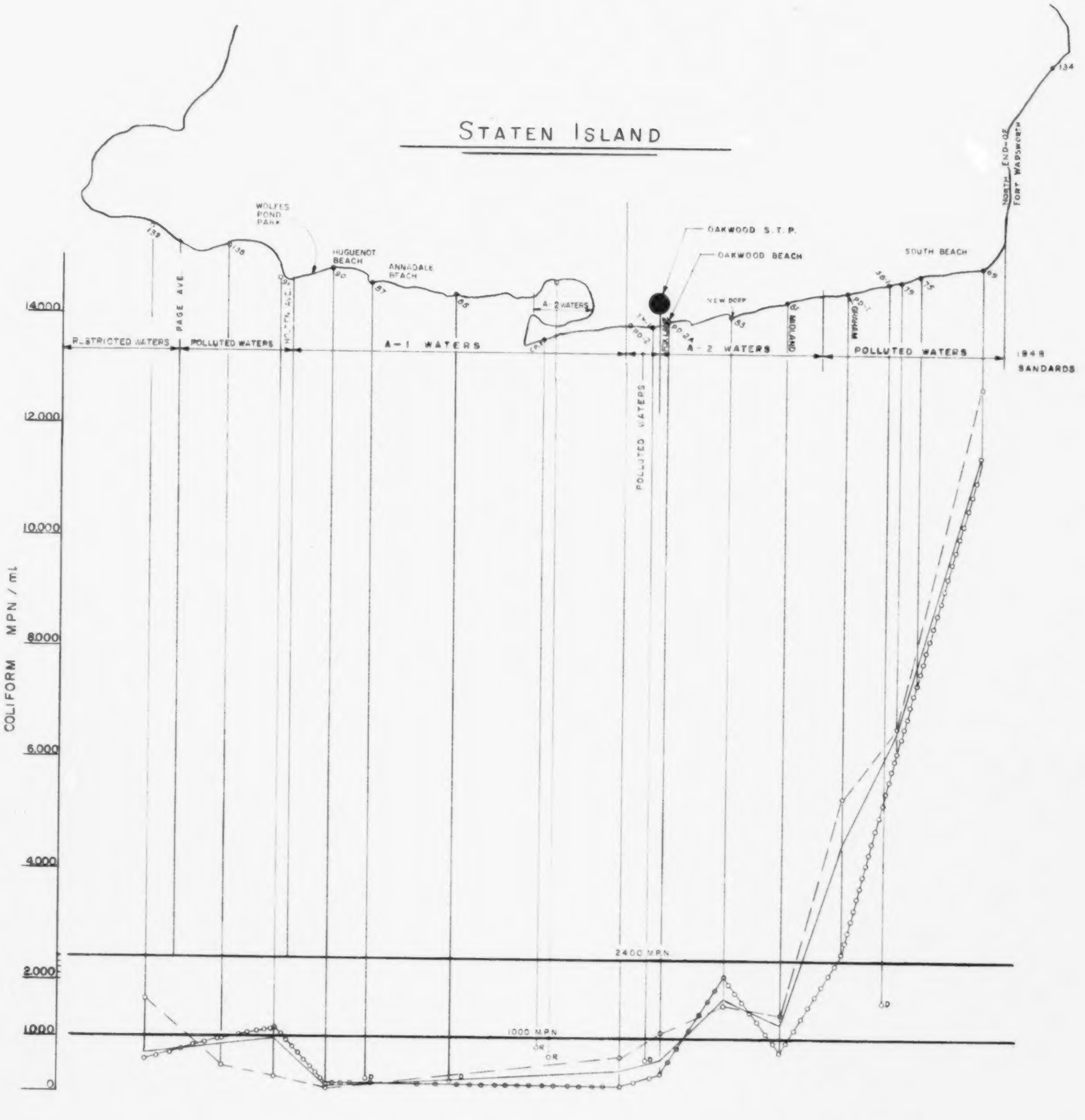

BUREAU OF
SANITARY ENGINEERING
N.Y. CITY
HEALTH DEPARTEMANT

POLLUTION CONTROL
STATEN ISLAND BEACHES

——	TOTAL AVERAGE	D-DRY
— —	RAIN AVERAGE	R-RAIN
-o-o-	DRY AVARAGE	

SAMPLING PER: 1951 - 1961

DATE JULY 1961

GPO 981932

of the Bay taken since that time have been satisfactory, and samples of clams taken from these waters are the equivalent bacteriologically of shellfish taken from other areas throughout the country.

When an outbreak of infectious hepatitis involving clams from the New Jersey side of Raritan Bay was reported by the New Jersey State health authorities, the New Jersey authorities closed their portion of the Raritan Bay waters for the taking of shellfish. Action to close the New York City portion of Raritan Bay for the taking of shellfish as a preventive measure was immediately taken by the New York State Conservation Department. These waters have remained closed. At all times during which the New York Raritan Bay area was opened for clam-taking, the dealers handling such clams were certified on the U. S. Public Health Service List of Approved Shippers.

Staten Island's localized sources of pollution that may affect Raritan Bay are few and with the exception of Tottenville, all sources have some degree of sewage treatment. The effluents have little, if any, effect on the waters of the Bay. However, the Department of Health, acting under the recently adopted (1959) Health Code, is proceeding with measures to secure improvement of the degree of treatment provided at Richmond Memorial Hospital, Mount Loretto Home for Children, S. S. White Co., and St. Joseph's Home. The Oakwood Beach sewage treatment plant provides secondary treatment, and operation of this plant has been a factor in the improvement of water quality in the Oakwood Beach area.

At present there are in the Tottenville area approximately 33,000 linear feet of existing sanitary sewers. These sewers, constructed thirty to fifty years ago, outlet directly through nine outlets into Raritan Bay, six on the Arthur Kill shore and three on the Lower Shore. There are approximately 650 houses which feed into these existing sewers with an estimated population of 2,600 people. These sewers empty approximately 0.3 mgd of sewage into the waters of Arthur Kill or Raritan Bay. About 10 percent of Tottenville is now served by sewers.

It is estimated that there are approximately 1,220 houses, or 4,900 people, who empty their sewage through cesspools and/or septic tanks. The subsoil in this area is largely sand and therefore there is little trouble with the septic tanks.

While the office of the Borough President of Richmond does not yet have drainage plans adopted for this area, approximately 20 percent of the area has been mapped.

The entire Tottenville area will be sewered by a separate system, the sanitary sewers emptying into a treatment plant will be built by the Department of Public Works. It is estimated that in order to complete the sewers in this area the following costs will be incurred based on 1965-1966 prices:

Sanitary Sewers	$10,400,000
Storm Sewers	13,100,000
Total:	$23,500,000

The Department of Parks is acquiring 150 acres in the southern section of the Tottenville area, thus reducing future population growth of that area.

Contamination from the existing sewers in the Tottenville area will be eliminated when existing sanitary sewers are intercepted by the Department of Public Works and the sewage diverted to the treatment plant that is expected to be constructed in 1965-1966.

Plans for future sewerage in southern sections of the Borough of Richmond have not been completed as yet. It is contemplated that the southern portion will be served by a separate sanitary sewer system. Hence, when sanitary flows are fully intercepted there will be no discharge of raw sewage into local waters along the Staten Island shoreline of Raritan Bay.

Plans of the Department of Parks reinforce the position with respect to rather rigid control of water quality along the shoreline. Plans are now in process for the development of an arterial highway extending from Miller Field and New Dorp southerly along the shore to Tottenville and Outerbridge crossing. Augmented recreational facilities and an increase of use of shore water for recreational purposes are future possibilities.

Thus it is clear that the city has been well aware of the need for protecting the Raritan Bay shoreline of Staten Island and has taken a number of measures directed to the execution of long-range plans for the maintenance of water quality along those shores.

The Total New York City Program of Pollution Control

Staten Island is only one of five boroughs of the city. Each has borders along the harbor and each has great needs for protection of water quality.

The construction program for water pollution control facilities evolved from the planning stage and engineering studies conducted before and after World War I. The sewage treatment and intercepting sewer facilities presently in service were built in two major stages. The first wave of construction occurred prior to World War II from about 1929 to 1941. During this period the following projects were designed, built and put into operation:

Project	Capacity MGD	Cost in Dollars
Wards Island	220	$32,000,000
Coney Island		
(a) 1st Stage	35	2,100,000
(b) 2nd Stage	35	4,000,000
Tallmans Island	40	5,700,000

Project	Capacity MGD	Cost in Dollars
Bowery Bay	40	5,400,000
City Island-Harts Island	1.5	700,000
Jamaica	65	7,000,000
26th Ward	60	
1st Stage (Primary)		3,000,000
2nd Stage (Secondary)		6,600,000
TOTAL	496.5	$66,500,000

During the lull in construction incident to the last war, designs were prepared for the second wave of construction which began in 1948. This effort produced the following facilities:

Project	Capacity MGD	Cost in Dollars
Hunts Point	120	$ 26,100,000
Owls Head	160	21,500,000
Rockaway	15	7,000,000
Port Richmond	10	3,200,000
Bowery Bay Ext.	80	46,750,000
Oakwood Beach	15	7,800,000
Whitestone Interceptor Collector - Tallmans Island		2,500,000
Wards Island - East Bronx Inter.		1,400,000
Hunts Point - 2 Pumping Stations		600,000
	400	$116,850,000

Shortly after World War II and before the above pollution control construction began, the Interstate Sanitation Commission began pressing the city for an acceleration of sewage plant construction. In late 1948, during the administration of Mayor O'Dwyer, the city agreed to a consent order of the Interstate Sanitation Commission under which it was agreed that the Hunts Point, Owls Head, Rockaway, Port Richmond (First Stage), Bowery Bay (Second State), and Oakwood Beach projects would be completed and placed in operation by the end of 1953 and the balance of the complete program would be constructed and in operation by the end of 1959. The order left an escape clause by which the city could reapply to the Commission for a change in the time limit if circumstances warranted such reconsideration.

The advent of the Korean War upset the time schedule considerably. Construction proceeded rapidly until this conflict, but due to heavy cost increases and shortage of engineering personnel the program slowed. As a result, the first commitment to the Interstate Commission was not completed until the end of 1957.

The city applied to the Interstate Sanitation Commission in 1956 for an extension of the program called for in the Consent Order of 1948, and in 1957 a modified Consent Order was agreed upon between the city and the Commission, under which the final clean-up was to be committed to contract by the end of 1965, subject to a one-year delay provision if final estimates of cost exceed preliminary appropriations. This latter order mentioned a minimum yearly commitment of $22,000,000 for the pollution control program. The actual costs, however, are increasing at the rate of 5 percent to 7 percent per year above earlier estimated costs.

Completion of the programs originally planned was slowed by a need to expand existing plants before construction of certain new plants was started. The population of the city, according to the 1960 census, fell from 7,795,471 in 1950 to 7,681,021 in 1960. There was, however, a vast shifting of the population around the city and in general the drift was to the periphery, as shown in the following tabulations:

Population Tributary to Jamaica Bay

Project	1940	1950	1960
Coney Island	527,156	579,588	604,147
26th Ward	347,596	319,942	316,232
Rockaway	38,793	51,103	66,749
Jamaica	456,159	517,197	582,335
Total	1,369,704	1,467,840	1,569,463
Population Tributary to Inner Harbor			
Wards Island			
Bronx	741,243	748,200	695,007
Manhattan	627,183	646,643	542,406
Marble Hill	4,568	4,842	8,135
	1,372,994	1,399,685	1,245,548
Hunts Point	638,774	688,718	703,188
Tallmans Island	159,790	251,660	390,674
Bowery Bay	502,708	596,187	633,063
Owls Head	870,916	882,659	797,719
Newton Creek	1,351,188	1,360,000	1,204,000
Red Hook	242,931	249,615	234,545
North River	733,332	776,611	661,334
Port Richmond	117,355	127,806	131,183
Population Tributary to Other Plants			
Oakwood Beach	34,151	39,965	59,390
City-Hart Island	4,863	3,869	5,595

In order to keep abreast of this movement, the city prepared plans and awarded contracts to expand existing plants, as follows: -- Although the population decreased, a shift in population brought about the need to increase some of the other treatment plants.

Project	Capacity MGD Existing	Capacity MGD Expanded	Estimated Cost of Expansion
Coney Island	70	110	$14,000,000
Rockaway	15	30	6,000,000
Jamaica	65	100	17,250,000
Hunts Point	120	150	7,000,000
Tallmans Island	40	60	6,500,000
Total	310	450	$50,750,000

Some $51,000,000 of scarce capital funds had to be diverted from controlling pollution in unintercepted areas in order to prevent sewage overflows in areas already under control.

The city is now in the third and final stage of construction and by 1965 or shortly thereafter, plans call for completion of the following projects:

Project	Capacity MGD	Est. Cost in Dollars 1962 Prices	Amount Commited To Date In Dollars	% Complete
Newtown Creek-(Brooklyn)	310	140,000,000*	41,770,519	80
Coney Island - (3rd Stage) "	40	14,000,000**	12,705,216	85
Red Hook "	40	17,250,000		
Rockaway (2nd Stage) (Queens)	15	6,000,000**	4,954,448	98
Jamaica " "	35	17,250,000**	16,113,225	5
Tallmans Island(2nd Stage)"	40	6,500,000****		
North River (Manhattan)	220	87,000,000****		
Wards Island (2nd Stage) - Manhattan and Bronx	60	29,000,000***		
Hunts Point (2nd Stage)(Bronx)	30	7,000,000**	6,250,000	0
City Island-Hart Island (2nd Stage) "	1.5	500,000		
Port Richmond Ext. (Richmond)	40	29,000,000		
Tottenville "	6	4,000,000		
Fresh Kills "	10	7,000,000		
Bloomfield "	10	5,000,000		
Oakwood Beach (2nd Stage) "	15	14,250,000		

Project	Capacity MGD	Est. Cost in Dollars 1962 Prices	Amount Commited To Date In Dollars	% Com-plete
Alterations and Additions to Sewage Treatment Plants		14,000,000		
Total:	872.5	397,750,000	81,793,408	

Note:

* Under Construction and Design
** Under Construction
*** Under Design - Department Forces
**** Under Design - Private Engineers

The pollution control picture in New York City along the south shore of Staten Island, Raritan Bay and the Arthur Kill is the brightest of all areas in the city simply because the areas are largely undeveloped and because it is the intention of the city to construct separate storm and sanitary sewers in these areas. No work is under way as yet but preliminary studies are being made for the Tottenville area. Under the modified consent order of the Interstate Sanitation Commission agreed to by the city in 1957, the Tottenville, Fresh Kills and Bloomfield plants (areas 18, 17 and 15 on attached map) were to be undertaken after 1965. However, because of the expected population increase due to the construction of the Narrows-Verazzano Bridge, planning and design of these projects has been advanced. Tottenville Treatment Works will be designed to give secondary treatment and effluent chlorination. The Fresh Kills and Bloomfield Works will be designed for primary treatment initially with space reserved for secondary treatment later because it is the judgment of our engineers that all sewage entering the Arthur Kill will have to receive secondary treatment in order to maintain a minimum dissolved oxygen content of 30 percent.

Because the city's sewerage system is largely of the combined type in which the same conduit conveys storm run-off and dry weather sanitary flow, there is a certain amount of unavoidable pollution which escapes to the harbor when the combined storm run-off and sanitary flow exceeds the capacity of the intercepting sewers. In general, the interceptors are designed to convey twice the average dry weather flow to the treatment works. This capacity is considered the most economical compromise and results in a loss of sanitary sewage to the tributary waters of about 3 percent of the total annual sanitary flow. While this appears to be a small amount in volume, its sanitary significance is important because in the summer months when bathing is popular, the bacterial pollution of the waters may exceed the allowable standards of the Department of Health. Past records show that, on the average, we may expect rainfall twice a week in the summer of sufficient intensity to cause overflow of combined sewers. During these periods of overflow up to 90 percent of the sanitary flow may escape. Coliform organisms, which are indicators of possible disease-bearing organisms, die off at a rapid rate in salt or brackish waters, but the residual population is sufficient to preclude safe public bathing in Jamaica Bay, the Upper East River and in general, everywhere in the inner harbor.

In order to cope with this pollution problem, created by combined sewer overflow, the Mayor's Committee on the Elimination of Sources of Marginal Pollution was formed under the charimanship of the Commissioner of Public Works. This committee consists of the five borough presidents and the Commissioners of Health and Parks, with the Commissioner of Public Works as chairman. Private consulting engineers were retained to study the problem in cooperation with our own engineers. Reports have been submitted which propose solutions involving the construction of storm water treatment plants and supplementary conduits, etc., which if successful would enable the creation of additional bathing facilities in Jamaica Bay, at Marine Park and Plum Beach in Brooklyn; and at Ferry Point Park, Bronx; Clearview, Queens; and other locations in Eastchester and Little Neck Bays. The costs involved are estimated at $175,000,000. This program is about to start with an engineer's contract for the design of the first storm water treatment plant at Spring Creek in Brooklyn. This will be a test installation.

The total pollution control program of the city may be summarized. The overall pollution control program provides for treatment plants in eighteen areas covering the five boroughs of the City of New York. The ultimate goal is the treatment of about 1,700 million gallons of sewage per day, the estimated ultimate sewage flow in the year 2000. With the completion of the first stage in 1959, about 50 percent of the ultimate goal was reached. Capital funds expended for the first stage and prior construction totals about $185,000,000. The city is now embarked on the second stage of the work estimated to cost up to $415,000,000 when completed. In addition, a program for correction of pollution in beach areas caused by rainfall, known as the Marginal Pollution Control Program, is estimated in the amount of $175,000,000. This represents a total of about $775,000,000 for the overall program.

The Tottenville areas and other areas of Staten Island contiguous to Raritan Bay have been the last areas scheduled for pollution correction (1966) due to their remoteness from the concentrated areas of pollution. However, due to recent Federal interest in Raritan Bay because of certain critical contamination of its waters, the pollution problem of the south part of Staten Island has come into focus.

The city would be hard pressed to find funds for pollution control construction at this time in this area because of the heavy commitments for seven plants now in the process of expansion and the construction of its largest plant, the Newton Creek plant, which will clear up to 320 MGD in Lower Manhattan and large sections of Queens and Brooklyn. Further, planning is under way for the 220 MGD North River Plant which is scheduled for construction in 1962.

The 1961 Capital Budget has an allotment of $41,380,000 for pollution control, including $500,000 Federal funds and $2,725,000 State funds. While this amount is far above the $22,000,000 rate pledged to the Interstate Sanitation Commission, it is below the needs of the Department of Public Works as stated in their 1962 capital budget request. The Department requests an amount of $99,260,000 of additional funds for 1962, $35,000,000 for 1963, and $61,000,000 for 1964.

The estimated cost of the public works construction for the four projects in south Staten Island is about $31,120,000. Planning for this work is scheduled in 1966. Advancing the work in Staten Island earlier than 1966 would aggravate the capital budget picture for 1962, 1963 and 1964 still more.

It is the considered opinion of New York City officials that protective measures for Raritan Bay waters are necessary, and such measures have been fitted into an overall construction time schedule. If Federal and State government agencies concur on the need of a more urgent time schedule of studies and improvements, it does not seem unreasonable to anticipate that these agencies would also be willing to furnish grants of funds permitting both the city and the State of New York to proceed at an earlier time.

MR. STEIN: Dr. Kandle, does New Jersey have any comments or questions?

DR. KANDLE: No.

MR. STEIN: Mr. Glenn, do you have any comment or questions?

MR. GLENN: No.

MR. STEIN: Mr. Pinel, I have one question. I am a little puzzled by your last statement. If the Federal and State agencies concur, you say, that these agencies would also be willing to furnish grants of funds permitting both the City and the State of New York to proceed at an earlier time. By that I assume you mean that the State should furnish you some funds?

MR. PINEL: That is the idea.

MR. STEIN: I just welcomed New York State aboard. Generally people ask us. It is indeed refreshing to have you ask the State.

MR. PINEL: Mr. Ingram is here from the Health Department if you wish to ask any technical questions on this program.

MR. STEIN: Are there any comments or questions?

DR. INGRAHAM: I would like to call on Professor Ingram to speak briefly, and also Dr. Fuerst from the New York City Health Department, and Mr. O'Leary from the Department of Public Works.

MR. STEIN: What would your pleasure be before we go on with this? I think if we push through, unless there are some unanticipated developments, I think we may be able to complete this this afternoon. With that in mind, do you think it would be appropriate to recess for 10 or 15 minutes now and continue on through and try to complete this whole conference, if that is agreeable? We stand in recess then for 10 minutes sharp.

(Whereupon, a recess was had.)

MR. STEIN: May we reconvene, please. Dr. Ingraham, would you resume, sir.

DR. INGRAHAM: Yes. I would like to call on Professor Ingram, who is consultant to the New York City Health Department, to make a few remarks.

MR. STEIN: Thank you.

STATEMENT OF WILLIAM T. INGRAM, ENGINEERING CONSULTANT TO THE COMMISSIONER OF HEALTH, NEW YORK CITY

PROF. INGRAM: Maybe I can stand over here. I would like to comment just a little bit more. My name is William T. Ingram. I am engineering consultant to the Commissioner of Health, New York City. I would like to comment a little bit further on one of the charts that is incorporated in the statement of the City of New York, because it has some bearing on material presented this morning by the Public Health Service with respect to the degree of pollution of the Staten Island shore. They presented the information which indicated the count showed an increase in trend from 1958 to 1961. There was also something he said about the shoreline of Staten Island being of questionable water quality, and not acceptable by United States Army standards. Of course, those are for drinking water and not for bathing in naturally constituted waters. They have not been tried in the same way that the New York City Health Department standards have been tried.

Many tests have been carried out by the New York City Department of Health, and studies have been conducted of coliform counts and viable pathogen manifestations. We find that these begin to appear when the 2,400 coliform occurs in the water with a great deal of reliability. So this is one of the reasons why in 1958 the Department of Health and Board of Health adopted as part of its declaration a standard of 2,400 MP, per 100 milliliters.

Referring to the map -- and I am sorry I do not have a beautiful chart like the one that was demonstrated this morning to point to, but I think I can make this point rather clear with this -- on an eleven-year average basis the waters from about midway of the Midland Beach area, all the way to Tottenville, are well within the New York City standards for bathing water quality of 2,400 MPN. And the waters between Oakwood Beach and Wolfe's Pond Park are below the 1,000 level, which from our point of view takes them completely out of the questionable class altogether. These waters, in other words, are good waters for bathing according to the New York City Health Department standards.

I would like at this time to ask Dr. Fuerst to make a further comment concerning the remarks that were made in the New York City statement with respect to the epidemiology of infectious hepatitis in New York City.

MR. STEIN: Before you leave, Prof. Ingram, I know the Army is not here, and I think we are all working for the same kind of record, but the Army does put out bulletins -- I think they call them T/B, which means technical bulletin, and not tuberculosis -- and it says MED 163. Then when they get into the appendix they talk about inland fresh waters and tidal salt waters. I do think a fair interpretation or reading of the Army standards will indicate that they do have a standard for salt water bathing when they say over 240 is unsatisfactory. I am not talking about the validity or lack of validity, or the basis for their standards, but for the record I think they purport to cover tidal salt water.

PROF. INGRAM: All right. I won't argue with you. Dr. Fuerst, could you add some words?

STATEMENT OF DR. HAROLD T. FUERST, DIRECTOR OF THE BUREAU OF PREVENTABLE DISEASES, NEW YORK CITY DEPARTMENT OF HEALTH

DR. FUERST: Dr. Harold T. Fuerst, Director of the Bureau of Preventable Diseases, New York City Department of Health. I would like to comment on our investigations into the relationship of shellfish and hepatitis in New York City in 1961. The situation came to our attention first of all through Dr. Robert Korns of the State Health Department, who informed us in a preliminary way of the findings of New Jersey. This occurred about the middle of April -- April 12th or 13th, as nearly as I can remember. We were informed that suspicion was aroused because of a difference in the age and sex ratio in cases of hepatitis in 1961 as compared with those of previous years.

In looking over our records of current and previous years in New York City we have found no such difference in the age or sex ratio. We always had and continue to have a predominance of cases among males as compared to females in a ratio of about 1.6 to 1. We also had, in reported cases at least, a high share of adults, persons over 20. 55 to 60 percent of our reported cases being persons over 20.

On receipt of this information we went ahead with a preliminary investigation of our own along epidemiological lines, and the first type of investigation that was done at that time, because it appeared most expeditious, was an investigation of hepatitis cases then in hospitals. This was carried out within a few days, as soon as this verbal report had been received, and in the investigations that followed a series of controls was investigated at the same time. Hepatitis cases then in hospitals were visited and were questioned according to their prescribed questionnaire, which had to do with shellfish eating habits in general, both cooked and raw shellfish, and had to do specifically with the ingestion of raw shellfish during the six-weeks' period prior to the onset of illness. The controls in this investigation were persons hospitalized who did not have hepatitis, and they were matched according to age and sex, and by proximity in the same institution, in the same unit, and classified as to whether they were private patients or service patients in these hospitals.

In this first group of individuals investigated there were 102 cases of hepatitis and 97 controls. Among the 102 cases of hepatitis, 12.7 or almost 13 percent had eaten clams during a six-weeks' period prior to onset. Among the 97 controls, matched in the way I have mentioned, 9.3 percent, or about 9 percent had eaten shellfish prior to the onset of their illness. The differences obtained between the two groups were not significant in this particular instance.

The second investigation that was carried on was a retrospective one in which cases of hepatitis reported during the month previous to the original observation mentioned, were reinvestigated and a series of controls included herein, matched by place of residence and according to age, and some rough estimate of economic status. In this second group we had 75 cases and 71 controls. Among the 75 cases in this group, 16 percent had had raw shellfish prior to the onset of illness. Among the 71 controls, 7 percent had raw shellfish prior to the onset of illness.

The third type of investigation, or the third series of cases investigated were those newly reported, following the original observations reported to us about the middle of April. This group consisted of 268 cases reported from the period April 14th to June 30th. With this group there were 125 controls. The overall result in this third group indicate that there were 268 hepatitis cases of whom 14.9 percent, or 15 percent, had shellfish prior to onset, while among the 125 controls 7 percent had such a shellfish history.

Analyzing it statistically, the differences in these groups did not prove significant, but when all three groups were combined it has an overall total of 445 cases. The difference between hepatitis cases and controls with regard to shellfish ingestion proved to be of borderline significance. The grand total was 445 cases of hepatitis, of whom 14.6 percent had a shellfish eating history. Among 293 controls 7.8 percent had the history of eating shellfish.

We were interested in going into the differences between the results obtained in New York City and those obtained in New Jersey, and I think part of the answer here was furnished by an investigation of shellfish sources of New York City cases. This investigation of shellfish sources was going on concurrently with our investigation and with our epidemiological investigations through the agency of the Shellfish Division of the Bureau of Food and Drugs in the Department of Health.

I shall not go into the intensive tracing of shellfish sources through retail outlets and wholesalers, and so on, but it appeared quite obvious that there was no very predominant source for shellfish in New York City; that the shellfish supply came from all up and down the eastern seaboard; and in particular it was estimated that no more than 5 percent of the supply of raw shellfish sold and consumed in New York City came from Raritan Bay waters. In conference with Dr. William Dougherty of the New Jersey State Health Department, I find that his estimate is that about 70 percent, if I am not mistaken -- about 70 percent of their shellfish supply had come from the waters of Raritan Bay.

In going a little further into this situation we analyzed a number of cases of hepatitis and a number of cases, or a number of control individuals in regard to the source of the shellfish consumed by them, and in this group we found only two of 32 hepatitis cases that has a possible association or a correlation with the Raritan Bay shellfish. Again quoting Dr. Dougherty as the New Jersey State Health Department, in their cases 89 percent -- 89 percent of their cases of hepatitis had an association or possible association with clams taken from the Raritan Bay area.

So that in conclusion I would say that our results differed quantitatively in a very marked way from those of New Jersey, and it has been our opinion that the difference reflects the difference in proportion of shellfish supply from Raritan Bay and the City of New York as compared with the shellfish supply of the Raritan Bay in New Jersey.

MR. STEIN: Thank you. Let us see if there are any comments or questions. Are there any? Dr. Ingraham.

DR. INGRAHAM: May I make one final statement? May I just note in conclusion at this time then we have noted a number of items in the report that was presented this morning that we would like to investigate further after a thorough and complete reading of the report as written, so we are certain that we understand what was intended; and, we trust that through the conferee, Dr. Hilleboe, we will have an opportunity to place these comments we may have on record in writing.

MR. STEIN: Yes, you will. Thank you. I would like, if we may, to call on Dr. Langmuir to see if he has any comment.

STATEMENT OF DR. ALEXANDER LANGMUIR, CHIEF OF THE
EPIDEMIOLOGICAL BRANCH, COMMUNICABLE DISEASE CENTER

PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

DR. LANGMUIR: I am Dr. Alexander D. Langmuir, Chief, Epidemiology Branch of the Communicable Disease Center of the Public Health Service.

We are really in a very primitive stages in our understanding of the relation of the eating of shellfish and hepatitis. It was only in March of this year that the first epidemic known in the western hemisphere was recorded. There had been one or two earlier suggestions, but the only well recorded epidemic of hepatitis traceable to shellfish occurred this year, and this was at Pascagoula, Mississippi. It is not pertinent to the clams in Raritan Bay except that it illustrates the dynamic nature of our field of epidemiology, and how an old-time disease like hepatitis takes on a completely new emphasis in 1961.

Before this, to my knowledge, there was one epidemic in Sweden in 1955 traceable to oysters that were kept in a float in a certain harbor where pollution came along, channeled in an unappreciated way. Here cases occurred particularly among doctors and other professional groups in widely separated parts of the country traceable to oysters which had been in one float.

At Pascagoula the evidence also is open and incontrovertibly clear that the oysters that caused the outbreak came from a very small area near the mouth of the Pascagoula River. It is a classic picture for which there is no equal to my knowledge.

In the Raritan Bay situation I am reasonably familiar with the evidence, I think, and to me the problem gets to be more muddied because of the extraordinary shipment and trans-shipment and interchange of the clams in the process of their merchandising, so that it is impossible to trace specifically the clam that appears on a certain plate, to its origin. The impressive thing to me is that there are as many as 50 to 100 clear-cut cases where the only source was Raritan Bay, and then the possible sources covers a very large portion of other cases.

As I watched and lived this with Dr. Henderson and the whole group of people working with Dr. Kandle and Dr. Dougherty, the more detailed the investigation, the more clear the picture became. This to me is perhaps not crucial in a sense of how many total cases are ascribable to the Raritan Bay source, but certainly the entire picture in all of its details justifies the conclusion that has been reached, which I think is an interpretative conclusion that a substantial or a significant number of cases are traceable to Raritan Bay.

Now, where in Raritan Bay they are traceable to is another problem wholly different. This means getting eyewitness accounts in great detail from the people who dig up the clams at various times of the day, and sometimes at night I gather. This would seem to be a much more difficult process.

I would say from the general background that I would predict that there were probable relatively limited areas, rather than a whole area being the source -- the whole Raritan Bay. It is probably limited areas such as at Pascagoula, and such as one float in Sweden. But let us say we have only these three incidents to go on. There is an enormous amount of additional study and background necessary before we even begin to define these conditions.

To the question that you asked this morning about pollution and clams, I would say with confidence that in waters that are polluted the risk of the shellfish from those waters producing disease would be pretty much in direct relation to the amount of pollution; and in a heavily polluted area I would think that all of our knowledge points to this being a more hazardous place to take clams or other shellfish.

With regard to Dr. Fuerst's comments, we have been very much interested in it and very much concerned because we anticipated that there would be more shellfish-related hapatitis in New York because there is around this metropolitan area this strong presumption, growing into solid evidence. I am much impressed when he has gone into group after group, he has gotten evidence that a small proportion of the hepatitis cases in New York seem to be related. I think his explanation is very sound that the source of shellfish in the city is probably to a very large degree other than from Raritan Bay. Also I would urge that he separate his cases by socio-economic groups and other kinds of circumstances because the cases in New Jersey and Nassau seem to be among the more prosperous persons and traveling salesmen, and those who go to some of the better restaurants. If you could separate out the cases in housing projects and other groups where we know the disease spreads by contact like measles -- if you could eliminate those by some kind of grouping, I wonder if your proportions in a smaller number of cases would not show up more clearly that some of your cases were related as to shellfish.

MR. STEIN: Thank you.

DR. INGRAHAM: This concludes the presentation of the New York State Department of Health, since Mr. O'Leary has not returned from his budget hearing. I would like to say in closing, we in the State Health Department are quite convinced, on the evidence presented, that clams from Raritan Bay did in fact carry hepatitis; and in order that some of my earlier remarks about procedural matters be not misconstrued, I should like to reaffirm for the record that the New York State Health Department welcomes the interest of the United States Public Health Service in efforts to abate pollution of New York Harbor, and to assure you again we will join wholeheartedly in any reasonable and cooperative endeavor to improve the situation.

We are thoroughly convinced, on the basis of our past dealing with many members of the Public Health Service that nothing but good will come of these cooperative efforts.

MR. STEIN: Thank you very much. Dr. Ingraham, I would like to point out this situation on procedural matters, and I think that the Interstate Commission probably had a problem with that too. It often arises in a case, and we have to recognize that this is a very delicate area of operation -- State, Federal and interstate agency relationships -- where the Federal Government on its own initiative institutes an action. This was not done in response to a formal request by a State agency. This necessarily puts this in a different posture.

I do not want this analogy misconstrued, but let us take the case of a man parking his car -- and I have been in this situation myself -- where I have parked my automobile in front of a fire hydrant and I come back and find there is a ticket on it. I am a little irritated at the man who put the ticket there. No matter how we soften this we did send you a formal notice, and we recognize this and recognize the problems. I think I would like to regard this, and I know that the Surgeon General and the Public Health Service regard this as part of our traditional Federal-State relationships, working with the State health agencies.

We do have a statutory duty to perform under the law. We believe that this duty can be carried out within the framework of our traditional relationships. We have had situations like this with more than half of the States now and I do not think that we have done violence to the Public Health Service - State Health Department relationships. I still go into those States and we still call each other by our first names, and I hope affectionately.

I wonder, does anyone else have anything at this point? We called for a discussion, but does anyone else in the audience or someone feel that they have some compelling information that the conferees do not have before them? If not we will go on to a discussion. I want to throw this open to the conferees, if you wish, to discuss any of these aspects, or else we will try to come up with a statement and see how much we can reconcile.

DR. KANDLE: I think the conferees, Mr. Chairman, if I may speak for the conferees on this side of the table, feel as we stated earlier, that the conference could properly be concluded by your summary, and we have tried to indicate some of the things we might hope would be in the summary.

MR. STEIN: Yes.

DR. KANDLE: We think we agree that our long-standing relationships with the Public Health Service assure us of all good intent, and our purpose is to maintain the Raritan in as good a state as it is possible for it to be.

MR. STEIN: That is right. I think we might use that Chart No. 1 as something to talk to in general, for the purposes of a summary. I am sorry that Mr. O'Leary is not here. I might ask some of the people who prepared that. Why was the Passaic Valley Outfall put in that chart? Does that have any relation to the Raritan Bay, or does it just have some relation to what comes through the Narrows?

MR. CLARK: Everything that comes down through the Narrows comes down and makes a swirl down there.

MR. STEIN: That is right. It is one of the areas I would like to throw open for discussion. This was not much discussed and maybe we can just hit on it right away, but as I see this, it is clear that the Raritan Bay waters are interstate waters within the meaning of the Federal Act since part of the boundary is across two or more States. The same thing is true for the Arthur Kill. Aside from the question of whether the waters from that materially affect the Raritan Bay or not then, they are interstate waters within the meaning of the Federal Act.

In addition, we do have this upper bay situation. There may be all the points theoretically at least, or all the possible sources of pollution are the ones which were pointed out here, which may or may not be Arthur Kill, depending on the flow patterns and what happened; and there may be stuff coming out of the Narrows and swirling down in there. I do not know whether we can get at all of the sources unless at least we take some cognizance of the upper bay, and this is where we may be left. This is an unknown avenue which we have not gotten into, and it has not been covered because it is outside of the scope.

DR. KANDLE: Could I make one other point?

MR. STEIN: Surely.

DR. KANDLE: In Mr. Clark's statement, and in some of the discussion that has come up here today, there has been also the point of run-off water. I think we cannot ignore run-off water with the large land area we have around here. This does raise, I think, some basic scientific problems with which we are not dealing very adequately. I mean all of us collectively.

MR. STEIN: Right.

DR. KANDLE: Because it has been the presumption in years gone by that run-off water was largely non-fecal in origin. Now we are beginning to bring these counts into these kinds of discussions. A number of the counts which were prepared today deal also with the problem of run-off water, so this is not quite as simple as it used to be.

MR. STEIN: Right.

DR. KANDLE: And as he said there are a number of points that are incident as to whether these were B. coli, or some other bug, and that sort of thing. We have this great big source, and if we take it into account and are going to use those numbers we were using then we have to argue about that point too, and also the rainwater, in the combined scope.

MR. STEIN: Right. I am very happy you brought that up and I agree with you. You may recall that at the close of Mr. Clark's statement I asked him why the streptococci testing was not done in this area, and evidently it is a method not being used. I have been impressed, in situations analagous to this in other parts of the country, where Mr. Clark and his group have gone into streptococci testing, and they are able to tell or at least to predict to the satisfaction of all the conferees there, and all the scientific personnel on the staff, whether the germs came from a human source, and even broke it down to whether it came from a human or warm-blooded animal, or whether it came from run-off off the land. These are very significant things which may have to be looked into.

I was impressed, aside from the procedural arguments -- and I don't know that we want to let these stand in our way in proceeding with a relationship -- but I was impressed with the fact that I do not think we are very far apart either in seeking for knowledge on the pollution situation, or the situation dealing with hepatitis. I think that the differences probably come about because of the defective state of the art -- the lack of knowledge perhaps -- and the fact that we have not had continuous exchange of views of our professional staff over a period of time. As I look at one of these situations, it seems to me that after the professional staff works with it we should be able to come to a unanimous statement on the physical conditions, and the causal relationships of discharges of waste into the Raritan Bay area and the tributaries here. I don't know that we have not achieved that in many of the other cases that we have been involved in.

I think that the agreement on a factual statement -- on a factual statement that all parties can agree with -- practically down to the last figure, has been the most important thing in getting an equitable solution of these cases both from the State, interstate and Federal levels, and by the acceptance of it by the people. If you look at the history of these cases, this is what has happened. I will take as an example what happened at my own backdoor, the Potomac River. There we did not call the storm water overflows marginal pollution because that was what was messing up the river. That river had been studied more than any other body of water to my knowledge, and yet until we could get everyone to agree on facts we were not moving toward a solution where all of the different jurisdictions would agree on a solution. This was done, and I think that problem is on its way to being solved.

Then we can say that these are interstate waters within the meaning of the Act. The point of the Surgeon General in the calling of this conference -- and here is where we may come to a difference -- is an indication that the discharges from both New York and New Jersey are causing conditions of pollution in these waters which endanger health or welfare; or, which he believes endangers health or welfare. The conclusions of both the major investigators from Public Health Service and the facts presented in the particular statement, and the facts presented by Dr. Henderson, indicate that they concur in this belief.

DR. KANDLE: Dr. Henderson was in past tense.

MR. STEIN: That is right. It was in past tense. However, this is what we point out: That shellfish beds are closed. Now the fact that shellfish beds are closed -- and I think on this we are all agreed -- the Interstate Commission said or indicated that it was because of the conditions that arose that shellfish beds are closed.

DR. KANDLE: No. Let us be clear about this.

MR. STEIN: All right.

DR. KANDLE: Those beds were closed because of the hepatitis.

DR. INGRAHAM: I think that is very clear.

MR. STEIN: That is right, but there were other beds closed to the taking of shellfish in the Raritan Bay area, and they have been closed over a period of long standing.

DR. KANDLE: Sure.

MR. STEIN: What I am pointing out is under the conditions of the waters you closed those beds in New York and New Jersey. It is a valid reason. The very fact that we have a certain quality of water and we have shellfish there. And but for that quality of water people would be happy to use and harvest the shellfish; and the Departments of Health in both States I assume would not prohibit anyone taking shellfish from water if shellfish were there and they wanted to take it, if there was not a valid reason. The fact that these beds are closed indicates there is a condition of water quality which makes you close the shellfish beds.

DR. INGRAHAM: That, of course, gets into the larger question of what is the best use of those waters.

MR. STEIN: That I know.

DR. INGRAHAM: That has to be decided before it can be said they are a detriment to health.

MR. STEIN: That is right.

DR. INGRAHAM: That is right.

MR. STEIN: You might say a detriment to health or welfare of the community, or the people gathering the shellfish. This may be a point.

This is a point, and these are the various points where we may differ. I think the Surgeon General's belief is -- and this is the point -- I do not want to single out shellfish --

DR. INGRAHAM: We are talking about this, so let us pursue the shellfish problem.

MR. STEIN: All right. But I think the fact that the beds were closed, one; and two, the fact that there was hepatitis, I think caused the Surgeon General to say in his belief that health or welfare was endangered. That word "endanger" we have been over now. It means to put in peril. It does not mean that someone is acutely getting sick right now.

DR. INGRAHAM: Has there been a determination by the Surgeon General that this is so, or was this conference called to investigate this?

MR. STEIN: That is right, but he called this on the belief. That is why I want to get down to these elements. I think that the Surgeon General called this conference because he had this belief that health or welfare was being endangered on the basis of all these factors. One was the shelifish situation, with both the closed beds and the outbreak of hepatitis. Two, was the fact that you do have parks and recreation facilities, and people go there and come into contact with water; and, three, the waters are used for bathing, pleasure boating, water skiing and fishing. The fishing we are not talking about, as I understand it, in terms of deleterious effects on fish life, except possibly in the center of the Arthur Kill where the oxygen has dropped way low; but people do handle fishing equipment, and fish, and so forth.

MR. GLENN: But that was not classified as being for recreational purposes up there at the Arthur Kill.

MR. STEIN: That may be.

MR. GLENN: Which was said after having a public hearing.

MR. STEIN: That well may be, and this raises another philosophical question -- the question of the best uses of the water. I do not think we have to get into this here, and I certainly hope we can come to a solution without getting into these ultimate philosophical questions, because there are many questions that the courts have not solved for 150 years.

DR. KANDLE: I would like to make one point, Mr. Chairman: That the hepatitis episode is unique, and I don't think one can say that because there are some portions of the bay which are not available for shellfish, that the public health is endangered. Because the facts are we have been in this business for fifty years and we have not endangered the public health, but have been regulating this industry as we have to regulate the milk industry, and almost all of the food industries. There is not any liberty just to go and come as you like, whether it is in bathing, or whatever. The facts are that we have inter-regulation and we and the industry have been working together and have been in this shellfish business for all of these years without endangering the public health.

This year we had something that had not happened. There had not been an outbreak in the country like this for maybe seven years, and maybe not before that. I cannot go back into the exact influence of this but this is a unique episode. We have to admit that. The facts are that the outbreak is over, according to the data in New Jersey, and I do not think there is evidence at the current time that there is danger to the public health.

MR. STEIN: That may be. What we are doing is exploring the possibilities. I do not want to blur over differences that we have. I am not certain that there would be unanimity of opinion that this necessarily is a unique episode. Some people may have the view that this may be a recurring type of episode which just was not analyzed before this. That is a possibility. I do not know. These are theoretical possibilities. Again, I think in this whole business dealing with the Surgeon General's position -- and this is what I hoped we would not get into, and I hoped to hit the other point here -- the question here is this: Our statute says, "endanger health or welfare of persons in another State." The question here is, whether by the setting of a standard by a State agency, or certainly a water using standard, whether for Federal purposes this is considered to endanger health or not. At least with respect to bathing beaches the Army seems to have a different view than you do here.

DR. KANDLE: They certainly do. A unique view.

MR. STEIN: I don't know whether it is unique because it seems to be the general view of the people of the State agencies of the Pacific Northwest. I am not judging either way on it, but as a matter of fact the best judgment is to get a 240 coliform count in all of the waters of the Columbia River, in the Pacific Northwest; and the people who know the technical difficulties of achieving that have to swallow pretty hard. But it is the point they make.

These things, I think, have to be taken into account and resolved, but let me give you the composite of what the Surgeon General thought. He thought that there was a danger to health and welfare because of the effects on shellfish; that the water was used for commercial fishing and sport fishing, pleasure boating and water skiing, and so forth. I think the report also talked in terms of the kills affecting wildlife.

DR. WENDELL: I want to make sure I understand, Mr. Chairman. Neither you nor the Surgeon General, as you understand his position, would contend, would you, that there was a danger to public health unless all of the waters of Raritan Bay were suitable for shellfish, would you?

MR. STEIN: I don't understand your question and I don't think it is my function here to contend anything. I am just trying to get a factual picture. I certainly can't speak for the Surgeon General, Dr. Wendell.

DR. WENDELL: In your own view, in explaining your interpretation of the statutory language with respect to conditions endangering public health or welfare, as part of your own explanation you wouldn't contend, or would you, that there was within the meaning of this statute a danger to public health or welfare unless all of the waters of Raritan Bay were suitable for shellfish?

MR. STEIN: I do not think I am capable of making a judgment on that on the basis of the information I have at this time.

DR. WENDELL: In other words, you certainly, in your interpretation of this statute, have not determined any such thing?

MR. STEIN: I have made no judgment on that basis.

DR. WENDELL: All right.

MR. STEIN: I think in view of these epidemiological studies from New York, and Dr. Henderson, and Dr. Langmuir, I would have to know a lot more about this before I would presume to make a judgment, and I would hope that through this process we would get the conferees to make a unanimous judgment. I do not think it would be helpful to the whole conference process if we would stake ourselves out, or at least if I would, on any individual area of judgment at this time.

DR. WENDELL: Right.

DR. LANGMUIR: May I speak to this point as to whether or not the Raritan Bay hepatitis is unique? I hope it is unique, Dr. Kandle, but I think we ought to have a little more time to observe it. Until March of this year we didn't know of any such event, that is, shellfish leading to hepatitis. We were not aware, and I am relatively close to it. We have not had a single outbreak of diarrhea relating to shellfish -- certainly not a proved one -- in more than twelve years.

From the time that the Pascagoula outbreak occurred, it brought attention on the problem, and it was as a result of joint conferences with you and Dr. Dougherty that the whole problem was uncovered. If there had not been a good deal of push here, it will would not have been uncovered. In the process of this a small outbreak traceable to the digging of bait clams off the point of Greenwich, Connecticut, has been uncovered. Clams were being taken in an illegal area but the association was found.

On top of this, not too widely publicized, but a matter of clear record, three separate studies have been made among the members of the Federated scientific societies meeting in Atlantic City, where diarrhea was traceable to the consumption of clams during the middle of April. I feel this is a little ominous to have four distinct episodes: Pascagoula, Raritan Bay, Atlantic City and Greenwich, all come up within a matter of three or four months.

I question whether we can call it now an unique thing, and I would think we have every reason to feel we will have more outbreaks associated with shellfish during the coming years.

MR. STEIN: I think we have to say on the basis of the reports, and at least on the conclusions of the Public Health Service staff investigators, that there is pollution of the Raritan Bay area and waters covered by this conference. I want to make this clear: That the only reason that the Raritan River was included in New Jersey was as a tributary. I do not know whether that is within the jurisdiction at least of the Federal agency, other than as a tributary which might be contributing to pollution. We have to cover all tributaries. But there was pollution caused by discharges from both States which endangered health or welfare. That was the conclusion of the Public Health Service investigators. I don't know whether we can say at this time that we have agreement from the State agencies that this is the case, although the State agencies speak more or less in terms of certain areas of pollution. Is this correct, or do any of you want to associate yourselves with the motion that there is pollution of the interstate waters of the Raritan Bay area caused by discharges from both States?

DR. KANDLE: If you define pollution broadly, of course it is so. I think we will have to talk about intolerable pollution.

MR. STEIN: That is right. I do not think we are talking about the extent. I think there is a pollution situation in the interstate waters of the Bay. As I say, I don't think we are very far apart. I think New York City, of course, is much farther along, at least in the material they presented here, than some of the others we have seen. That is, they have a construction schedule. They are moving along with the construction schedule. Presumably this is the ultimate goal that we may be facing, but in order to take up your points --

DR. KANDLE: Mr. Chairman, may I say I am a little surprised at that with all due credit to New York City. We do have a plan. We didn't outline it in that sort of specificity but the fact is that we are quite well ahead in a sense, we know. I spoke about the four places which we are working on hard now, and we are working jointly under a plan as the Interstate Commission said with respect to the Kill, under a set of ground rules as we understand them. We certainly got a long ways ahead when we got to Middlesex, and straightened that out. So we surely have a plan, and I think while we are not complacent and are not satisfied, that the record of the fact that there is a plan and it is proceeding well, and we are working hard at it, seems to be to be incontrovertible.

MR. STEIN: I would agree with that. I was talking in terms of the presentation of the New York group. I think if we possibly take up your points we can take it from the beginning or we can take the main one -- or the ones you or I consider such -- and the others might fall into place. If we take your point 3, would you object to taking that first?

DR. KANDLE: No.

MR. STEIN: "That scientific data taking into account a wide range of factors and technological problems, including health, conservation, water policy and uses and industrial processes are urgently needed, and are the critical issue in further control of pollution in the Raritan Bay."

I think this assumes that there is pollution in the Raritan Bay -- "..in further control of pollution." Is that correct?

DR. KANDLE: Sure.

MR. STEIN: Okay. I would suggest in looking at the state of the data as we presented it, we were as acutely aware of the gaps and deficiencies as you were, but what we did was we checked around with every available source to see what we could find. I do not think we were trying to develop anything at the last minute. The difficulty was, in presenting the data on the basis of available sources. I think we all recognize the need. What I would propose is that in order to get this scientific data, and since the Surgeon General is required to make a recommendation on the conclusions of the conference, I don't know that I for one -- and I don't know about you as colleagues of the Surgeon General -- can go back and say we can make a firm recommendation to him on the basis of the data we have now.

What I am suggesting is that the Public Health Service, in its traditional role of cooperating with the States, institute a study, or institute an investigation to take into account the factors that you had in No. 3, in cooperation with the State and interstate agencies.

DR. KANDLE: May I suggest a different verb?

MR. STEIN: Yes.

DR. KANDLE: May I suggest you join us in our work?

MR. STEIN: We would be happy to do that. We have a statutory responsibility for developing something. This is something that always comes up. We have no objection to putting it this way. The point is, when we join with you we all have budgetary and administrative problems. We have a statutory obligation to follow this through. What I am saying is, what we would suggest is that because of our statutory responsibility that we, from an administrative and financial standpoint, underwrite this and be sure it goes through to completion; and we would do this in the traditional way that the Public Health Service does, hopefully, when we produce a report. And as far as I can see we are dealing with physical facts and should be able to come to a complete agreement on the presentation of those facts. Is that agreeable or not?

DR. KANDLE: I will react first. I think that I have no great point of difference of opinion, except that I do not think that it is simply facts that we need, in the sense of our questions. I think those are pretty well known. If we collected all the data we all know about -- ours and yours -- and after all most of the data you presented was ours --

MR. STEIN: That is correct.

DR. KANDLE: We can compile that and we know it pretty well. The problems are technological and very difficult problems of what to do within the scope of the purpose of the waters, and what we can afford, and all the things that go along with it. Those are the sort of things we need to join forces about.

MR. STEIN: You said that in No. 3. I think we can at least identify the ideas. I don't know that we necessarily have to assume we are going to come up with a different view on water policy, on water uses, industrial processes, and so forth. In dealing with water quality problems throughout the country, and the problems you have worked with in CDC, there is no difference in viewpoint, I think, in what we want to do and what we are trying to get at. I think we should try to proceed with this and put in whatever has to be done to do it.

In this we would ask or try to ascertain what the State and interstate agencies were going to do or planning to do, and we would, in consultation with them, indicate to them what we were going to do, for example. I would suggest that we set ourselves -- so we can have this work out -- a date of not later than a year from today to reconvene the conference and see what we have come up with in this investigation, and see if we can proceed with that.

In addition, I think to get the first point you make about taking cognizance of State agencies and the experience of the State and interstate agencies in dealing with and preventing the pollution of Raritan Bay, I think that we all have to recognize we have a situation here which is very much different than we have in certain other areas of the country. By and large the wastes here are getting some sort of treatment. We do not have the situation where we have these tremendous cities just dumping their wastes in raw. I think you have had effective agencies operating for many years in going programs.

Under Point No. 2, I am not sure at this stage, and I have no objection to that, but I am not sure that this would not be better to be a conclusion possibly of this investigation rather than a statement now, because we may say we prejudge that. Again I am looking at this on the basis not so much that I do not think that has not been so, but on the basis of our data that we have presented here today I would hesitate to make any firm statements of this kind, which we may have to pull back possibly in some areas later on.

So if that is agreeable maybe we can allow that to be a task of the study group.

DR. KANDLE: I think it is the feeling of the conferees that the statement is so.

MR. STEIN: I think we can indicate that.

DR. WENDELL: Is there any disagreement among the conferees as to whether that is so?

MR. STEIN: I don't say that there is disagreement.

DR. WENDELL: Then it is a conclusion of the conferees.

MR. STEIN: I think we have many other conferees. We can say that this is an agreement of the State and interstate agencies. On the basis of the data that we have, I think we are going to have to evaluate this a little more.

DR. WENDELL: Under the statute these are the only conferees, aren't they?

MR. STEIN: No. The Public Health Service is a conferee. Isn't that correct?

DR. WENDELL: In other words, this is a unanimous conclusion of the conferees other than the Public Health Service, and the Public Health Service presently has no position. Is that it?

MR. STEIN: When you say, "unanimous conclusion other than" I am a little puzzled. I think it is a conclusion of the conferees representing both States and the interstate agency, and I think we can come to an agreement on that.

DR. INGRAHAM: Would you agree, Mr. Stein, that there is progress. It is a question of how far and how much.

MR. STEIN: Yes.

DR. INGRAHAM: This statement says there has been a continuous upgrade, of course. That statement is pretty much incontrovertible on the basis of evidence presented here today, isn't it?

MR. STEIN: Yes.

DR. INGRAHAM: Whether the progress is fast enough or goes far enough, there may be some area for discussion as to that, but the statement as it stands I find very difficult to quarrel with.

MR. STEIN: Do you want to stop on that? What you have said here is this: Let's read this. I have no objection to stopping with this clear statement that there has been and continues to be progress under a plan, and what you are dealing with is health, conservation and the economy of the area. I haven't heard very much in the record about the economy of the area, and this is where we get into specifics. This is the problem.

DR. INGRAHAM: It was certainly touched on in the New York City report.

MR. STEIN: Yes.

DR. INGRAHAM: The economy and money that has been raised, and some relationship to resources.

MR. STEIN: All I am saying, being here as a representative of the Surgeon General, is that I do not think we have sufficient data to be able to say this. We have no objection to this, and by not joining in we are not in any way disagreeing with this. All we are saying is that the data presented at this conference does not hit all of these points. I don't see that there is any objection to saying that the conferees representing the States were in agreement that there has been and continues to be progress under State and interstate agencies. Can't we say that in summary?

DR. INGRAHAM: I think we would be inclined to think we presented evidence today to indicate that there is a plan and there is progress.

MR. STEIN: Oh, do you want to say that?

DR. INGRAHAM: And much has been accomplished.

MR. STEIN: I would agree with that. If you want to work out a sentence on the first line of it, "There has been and continues to be progress, under plan," that is fine. That I think we can certainly say. However, as you recognize, I am going to have problems relating this on the basis of this record, to the economy of the area.

DR. INGRAHAM: That is something I think we will all have to agree could be looked into.

MR. STEIN: That is right. But could we arrive at an agreement --

DR. INGRAHAM: Whether each area is stretching itself to its economic utmost.

MR. STEIN: This may or may not be the case. Could we agree that we will all agree that there has been and continues to be progress under a plan?

DR. KANDLE: I agree to that.

DR. INGRAHAM: Okay.

DR. KANDLE: I want to say with regard to the economy matter, there are many other aspects in addition to the one Hollis has spoken about, obviously, again going back to the use of the water; because if one or another State elects to invite in and maintain, for example, the petroleum industry, one makes certain basic decisions and lives with them.

MR. STEIN: That is correct. It is the kind of stuff that we at this point I don't think have considered. Speaking individually, I may want to go out and make a judgment, but speaking for the Public Health Service, we can't. It is a problem which you people have been living with intimately all the time, and I don't think we can go back to Washington and show the Surgeon General on the basis of the record that this was a conclusion that we had the kind of evidence, or that we looked into it sufficiently to come to this conclusion at this point, that this is not entirely so, or that this is so important.

The next two points --

MR. MINCHER: Mr. Stein, can I ask a question? Does that mean Item 2 is taken in toto as it stands in Dr. Kandle's statement?

MR. STEIN: No. Item 2 we will take the first line of, which is the statement that there has been and continues to be progress under a plan to abate pollution of the waters of Raritan Bay and its tributaries. It is something we can all agree on. Is that right?

DR. KANDLE: I do not have any quarrel with that. The fact that it is under the surveillance of a variety of agencies seems to me to be a very clear point of view, but I don't know that it is a world-shaking observation.

MR. STEIN: Again we have a question here. I don't know whether this is the place to discuss it. I would rather not raise points of difference at this stage. On the matter of surveillance the question here is whether they have done it often enough, which is a question we did not get into, and there may very well be differences of opinion on it. I don't have any judgment on that at the present time, and it might be at the next session of this conference before we come up with a judgment of the surveillance question. It is an area which I would hope we possibly would not raise, since we are in such close agreement.

As to the last two points you have in your statement, I do not know whether it is appropriate for the summary, but as far as we are concerned we would certainly be an agreeable bunch of fellows if the other conferees want them in.

DR. KANDLE: I think they were looking forward, Mr. Chairman, to the fact that the Public Health Service and the Surgeon General, as a result of this day's endeavor and all the work that went before it -- that you were going to present a summary, and as I understood it, you would negotiate that with us.

MR. STEIN: Yes.

DR. KANDLE: And then if we were in agreement that would in fact be a conclusion, and we would not be having a recessed conference but we would finish the conference.

MR. STEIN: I don't know, and here is the point. I don't think at this stage that we can, unless we go through this scientific study, come to a conclusion and report back to the Surgeon General that we are prepared on the basis of the record that we have made today, gathered from all sources -- that we are prepared to conclude this conference.

DR. KANDLE: The conferees agree. The other conferees agree.

MR. STEIN: This is one we can differ on, but I personally don't think on the basis of what we have -- and as a matter of fact, Dr. Kandle, you yourself pointed out the inadequacy of some of the data, and the gaps in the conclusions. We recognized this when we put it forward. As I pointed out, there are, I think, very, very substantial questions here that I think need a little further elaboration. For example, what is coming down from the Narrows; whether there is pollution endangering health and welfare in fact from Arthur Kill, and how the water from the Arthur Kill comes out; whether the Army is correct in saying that those beaches are off-limits and should not be used. After all, this is the official publication of another Federal agency. It is the kind of stuff we would try to work out in the next year with you.

MR. GLENN: You are out of the Raritan Bay area now when you are talking about considering the Arthur Kill and the upper harbor. I thought our summary should be on the Raritan Bay area.

MR. STEIN: Arthur Kill was included in the notices.

MR. GLENN: No.

DR. WENDELL: Only to the extent that it may be a tributary and it may affect the Raritan Bay waters.

MR. GLENN: Yes.

MR. STEIN: That is correct. Let us read the notice of the conference.

We have no knowledge at the present time that the Arthur Kill does not go into the Raritan Bay or put wastes into the Raritan Bay. It is one of the problems we have to consider. As I understood Mr. Clark's report it was indicated that water or pollution in the Arthur Kill could under certain circumstances get to all portions of Raritan Bay. There was some information given to the contrary. This is one of the areas we are going to have to look into.

DR. WENDELL: It is just what we find so difficult to understand, Mr. Chairman. What you are now saying, when we talk of today's proceedings is that the Surgeon General has called a conference on the basis of inadequate information; that he has presented here today in his statement no information or inadequate information with respect to these points we are now talking about; and that on the basis of this inadequate information, both existing and presented here, the fact that the Surgeon General who called the conference has for some reason not presented the information is a reason why we should have another conference.

MR. STEIN: Just a moment now, Mr. Wendell. Just wait. The Surgeon General presented this conference on the basis of information he had available to him.

DR. WENDELL: Which was inadequate.

MR. STEIN: Wait a minute. One of the things he had as a reason for the conference was that, what was the number? 73 people had infectious hepatitis. But for sewage pollution these people would not have had infectious hepatitis from the oysters or clams in Raritan Bay. Another bit of information he had was that the Army had declared the beaches of Staten Island off-limits for soldiers. And as far as I am concerned, I never disobeyed that when I was in the Army. When they told me it was off-limits because of pollution I didn't go swimming there.

Another bit of information he had was that waters were extensively used for bathing and water skiing, for pleasure boating, etc. The information we had from our chief investigator and his staff indicated that contact with and ingestion of these waters was endangering health. The information we had from our group indicated pollution from all of these sources could reach every other part of Raritan Bay.

What we are saying here is that on the basis of information you have given, or the other conferees have given, that there is not unanimity of opinion on this, and we recognize that. What we are suggesting is, in order to resolve this in a positive way, instead of going at this, to use the suggestion that Dr. Kandle made, namely, "That scientific data taking into account a wide range of factors and technological problems, including health, conservation, water policy and uses and industrial processes are urgently needed, and are the critical issue in further control of pollution in the Raritan Bay." There it is. This we could all agree on and go forward with.

I don't see the point in emphasizing differences if we want to go forward and provide something useful as a result of this conference.

MR. GLENN: Would you say these waters are good maybe for everything with the exception of shellfish?

MR. STEIN: I don't think we can say this at this time.

MR. GLENN: What I am getting at is, a year from now will the Public Health Service or anyone else know how much treatment will be required to remove infectious hepatitis?

MR. STEIN: A year from now we will know whether we can make that judgment, or whether we are in sight of the answer to the problem. We close these things out, and we don't expect to stay here forever, but certainly at this point it is our job, and I think these people who have watched this throughout the country have recognized that our job is to turn this over to the State and local authorities and the interstate agencies and get out of this as fast as possible. One of our hard jobs, and something you at this stage might not realize, is terminating the case and getting out. This is something that sometimes is difficult to do.

DR. KANDLE: It is suggested by the dollars.

DR. WENDELL: We are offering you the opportunity to do just that.

MR. STEIN: I suspect, Dr. Wendell, that you would have offered this opportunity before we called the conference.

DR. INGRAHAM: Mr. Chairman, I hope you are not equating the two bases on which you said the Surgeon General considered there was a question of pollution, that is, the Army declaring bathing beaches off-limits -- which is a fallacy based on what we know not; and the careful study that indicated cases of hepatitis did come from clams in Raritan Bay.

MR. STEIN: No, I am not equating it. I think at this stage what we would like to do is just put out a laundry list of all the factors without equating one against the other, because again I do not think we are in a position to equate or jointly come up with an opinion on this. I think after this investigation we would.

DR. INGRAHAM: Everyone concedes that there is pollution in Raritan Bay. There is no question about that by any definition you try to draw up. There is certainly human feces in Raritan Bay, and there is evidence of it. On the other hand, the question of what the best use of Raritan Bay is, is a very serious and difficult problem.

MR. STEIN: We agree.

DR. INGRAHAM: And I think we always have to bear in mind that point, and not merely say that there is pollution and, therefore, something must be done about it. We have to decide how much needs to be done.

MR. STEIN: I think we are in perfect agreement on that, and I hope that the other conferees are.

MR. KLASHMAN: Mr. Stein, I do not want to prolong this, but there is something I would like to get clarified. Mr. Dappert, the New York State Health Department has certain bacteriological standards for classifying swimming water. It is my understanding that these standards call for the following: I am reading from what I think are those standards. It says:

> "(a) Satisfactory sanitary survey.
>
> "(b) Average content of coliform organisms not in excess of 2400 per 100 ml. of water for any given series of 10 or more samples from a beach except when the results of a sanitary survey may justify the use of the lower average of 240 per 100 ml. of water for any given series of 10 or more samples collected from a beach."

Then it gives an explanation of what you mean when you talk about not going by the 2400, and then it says:

> "For instance, high coliform content as a result of drainage from manured fields would have little sanitary significance, thus permitting the acceptance of the water for bathing purposes. On the other hand, low average values may be associated with high maximum value shown by the sanitary survey to be due to fluctuating pollution of public health significance."

MR. DAPPERT: What are you reading from?

MR. KLASHMAN: I am reading from an extract of your classification for bathing waters. Am I taking it out of context?

MR. DAPPERT: I would like to see that one, because I am quite sure it has nothing in the record with reference to standards we set up from the standpoint of the Water Pollution Control Board.

MR. STEIN: This is going to be a problem. I do not know that we should at this point continue particularly to get into a discussion of the validity of any particular standards. I appreciate your point of view on the standards. You have to recognize our point of view. They are a sister agency -- a Federal agency -- and they did put this out. We would like to explore it, but we do not know whether we can resolve it here.

DR. KANDLE: Can I point out that through the American Public Health Service as long as I can remember, and I was associated with it intimately

-- which dates back to 1946 -- that the Public Health Service and the APHA and the Association of State Sanitary Engineers, etc., have been wrestling with this problem of bathing standards, and I don't think there is any agreement about it.

MR. KLASHMAN: That is true.

DR. KANDLE: So could you be able to say that the United States Army is finally solving this great problem?

MR. STEIN: I don't think we have said that and I don't think this is the place or the forum in which to do it. That is why the Public Health Service has always come to a substantial agreement with the State Health Department on the applicability of bathing standards to that State. There has been no controversy about it, and I don't look for controversy in that area here. I don't know. This is something which we have a traditional way of working out.

MR. KLASHMAN: I just meant that the Army standards are not capricious.

MR. DAPPERT: For the record I would like to straighten this out. I think Mr. Klashman is getting something confused which does not apply for the standards of Class A or Class B waters as specified in the standards established by the Water Pollution Control Board. We have no bacteriological standards in those specifications. The only standard that has been made is the one in connection with sewage.

MR. KLASHMAN: No. This is out of the Sanitation Manual, Interpretive Material.

MR. DAPPERT: It is a guide and not actually a standard.

DR. COLOSI: Mr. Chairman, I have been acquainted with the waters surrounding Staten Island and Raritan Bay since 1935. I am a bacteriologist and I have made dozens of surveys. I know since 1935 there has been a tremendous improvement in the bacteriological quality of water. We accepted here the recommendations of Dr. Kandle that clear progress has been made and is being made. Do we understand that the intervention of the Public Health Service would hasten or accelerate this progress? This is one question I have in my mind. These agencies we are accepting now are producing satisfactory results.

MR. STEIN: There are several conclusions in that. One is, I don't know whether I would use the word "intervention." Secondly, whether it would hasten progress or not is difficult to say at this stage. I think that the record shows in other areas progress has been hastened, but the point is this: We do, sir, have a statutory charge and a statutory obligation to do this. This is an Act that the Congress of the United States passed. This is something we are bound to. I am here as an administrator, administering the Act. If it is demonstrated over a period of time that this kind of process does not hasten progress and as a matter of fact impedes it -- although I don't think that that is the conclusion of the Congress, because they just extended this provision and liberalized it, and they thought that this provision did expedite progress and it has been one of the few items in our budget which has not been cut over a period of years as it went through, and in addition these are judgments that are made by the Congress and not us. So I would ask you again in that spirit to see if we can come to an agreement here because I recognize from the interests you represent that you have to understand the spirit I am here in, in carrying out and administering the Federal law.

DR. WENDELL: Mr. Stein, is it the policy of the Public Health Service as you know it in administering this statute, to go into areas where there is steady and continuing progress being made without such a conference technique?

MR. STEIN: I don't know that there is any such policy. All I know is that the law is clear. When the Surgeon General has reason to believe that certain conditions exist, it says he shall call the conference. He arrived at that belief and the law was clear. He was required under the law to do this. This law says, "When the Surgeon General has reason to believe." This places a discretionary duty in the Surgeon General.

DR. WENDELL: If it is discretionary then it is up to him to decide whether he goes in or not.

MR. STEIN: No. As one of the lawyers in our office said, he is the only one in the world who knows what he believes, and I am sure that the Surgeon General is the only one in the world who knows what he believes; and if the Surgeon General has reason to believe this, he has to do this. I don't think this is done by the Surgeon General or anyone else in any kind of antagonistic fashion. It is recognized as a continuing program of working with the State and interstate agencies.

Is there anything more, or are there any other comments, or are we in substantial agreement on the basis of the summary.

DR. WENDELL: Agreement? What does the summary now state?

MR. STEIN: The summary now states -- and if you want me to go through all of this, the whole summary, I will do it. The summary will say that the waters of the Raritan Bay and the waters of the Arthur Kill are interstate waters within the meaning of the Federal Act. The summary shall say that there is pollution of the Raritan Bay emanating from some sources around the bay; the summary will say that scientific data, taking into account -- and I don't know whether I should read it for the fourth time -- taking into account a wide range of factors and technological problems, including health, conservation, water policy and uses and industrial processes are urgently needed, and are the critical issue in further control of pollution in the Raritan Bay.

To do this the Public Health Service will undertake a study in cooperation and collaboration with the State and interstate agencies to try to obtain this data; and another session of the conference will be called a year from this date; that cognizance was taken of the programs and the administrative machinery of the State and interstate agencies to control pollution of the Raritan Bay area. There has been and there continues to be progress under plans to abate this pollution.

Then you have the last two points, and I don't know if you want these continued, that the conferees welcome and appreciate the interest, support and collaboration of the Public Health Service in the collective efforts to preserve the Raritan Bay and particularly in solving the scientific problems. The conferees are willing to report to the Public Health Service at appropriate intervals. I might add that the Public Health Service is willing to report to the conferees.

MR. MINCHER: Were all of those items as you recited them, purportedly the agreement of the conferees?

MR. STEIN: That is correct.

DR. INGRAHAM: I would agree with what was said on this last occasion.

DR. KANDLE: Mr. Stein, do I understand correctly that you used the verb "that the Public Health Service will undertake"?

MR. STEIN: Yes.

DR. KANDLE: Under some legal obligation of the Act?

MR. STEIN: No, I didn't think I said that. If you would want that? Is that your feeling?

DR. KANDLE: I think one point that bothers me in our discussions -- and I only speak for myself and let the other conferees speak for themselves -- we believe very sincerely that No. 3 as it is stated, is a critical issue, but the kind of data we would need are problem-solving data; not a definition of the problem per se, because we do know a great deal about this. I don't say we know all we need to know, or all that is needed, but we need to have problem-solving data. For example, the study that is going to start next week down at Vicksburg, which will give us an enormous amount of new data about the hydrographics of the Arthur Kill.

MR. STEIN: I don't think we have a difference there. Perhaps both kinds of data are needed to round this out. Nor do we have to delay on the basis of past relationships. I don't think we have ever had any problem between the Public Health Service and the States in working out a satisfactory program of study and investigation. I think necessarily this will have to be left to that. I certainly think what you have just mentioned is very appropriate.

MR. MINCHER: Mr. Stein, you mentioned in your recitation of items, Items 2, 3, 4 and 5 of Dr. Kandle's statement on Page 5.

MR. STEIN: Yes.

MR. MINCHER: No. 1 was omitted. Was that inadvertent?

MR. STEIN: No, I didn't omit that but just changed that. I took out some of the adjectives because this summary has to be set down by the Surgeon General. What I did say was, cognizance was taken of the existence of the administrative machinery.

MR. MINCHER: "Experienced, effective."

MR. STEIN: Yes. That is what I took out. Because again this is something that the Surgeon General has to say. I think we have accomplished the same result by just laying this out in a kind of deadpan without using those adjectives.

DR. KANDLE: We agree.

DR. INGRAHAM: Do we get to say anything about studying further the most effective uses of the bay, and balancing those with questions of pollution abatement?

MR. STEIN: Yes. I thought Dr. Kandle's No. 3 said that when he talked about water policy and uses.

DR. INGRAHAM: Yes. I guess he does.

MR. STEIN: All right.

DR. WENDELL: Mr. Stein, in respect of that point there is a remark in the statement of the Interstate Sanitation Commission that I wonder whether, in the light of the Federal Pollution Control Act, could not also receive agreement here as amplification of that statement. These value judgments with respect to the uses of the water are the primary responsibility of the States to determine, are they not?

MR. STEIN: I am not prepared to state that at this time, and I don't know that we should get into it.

DR. WENDELL: Isn't that what the Act says? That the States are primarily responsible?

MR. STEIN: The Act says that the States are primarily responsible.

DR. WENDELL: That is all I am saying now.

MR. STEIN: No. You talk about value judgments. I don't know that we want to emphasize areas where we might have differences, and some of these areas, as you well know, in the law, the Supreme Court has not touched for 150 years. I don't know that it is going to be effective in getting that out, or that we can expect an agreement, or that I am authorized to make a statement like that. I imagine any judgment of that kind would have to come from the Secretary of the Department in consultation with the Attorney General. It would be presumptuous indeed for me to attempt to come to an agreement on that here.

Are we ready to adjourn, or does anyone in the audience, or anyone else, want to say anything now? If not, we stand adjourned until call next year.

Thank you very much for coming.

(Whereupon, at 5:15 p.m., the conference was adjourned subject to call of the Chair.)

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APPENDIX A

SUMMARY OF SEWAGE TREATMENT PLANT PERFORMANCE FROM INTERSTATE SANITATION COMMISSION RECORDS

FORT HANCOCK, NEW JERSEY

Fort Hancock is located on Sandy Hook. The treatment facilities provided at this base consist of primary treatment and chlorination with a capacity of .5 mgd. The discharge line from this facility discharges to the ocean off the east shore of Sandy Hook and does not enter the waters of Sandy Hook or Lower Bays.

HIGHLANDS SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/30/58	0.452	66	57	1242	60	47	1356	0
6/18/58	0.370	82	66	1264	93	62	1720	0
10/21/58	0.4*	69	74	1151	97	46	1940	0
5/ 6/59	0.4*	58	75	967	100	54	2000	0
6/ 7/59	0.4*	48	82	801	152	50	3040	50
8/25/59	0.4*	87	58	1451	138	35	2760	0
10/28/59	0.4*	68	46	1134	86	38	1720	0
12/15/59	0.4*	63	63	1051	62	59	1240	0
5/17/60	0.4*	73	65	1217	113	31	2260	25
8/ 1/60	0.4*	53	73	884	117	49	2340	25
8/22/60	0.4*	90	49	1501	No Samples Taken			0
9/ 2/60	0.4*	84	42	1401	63	36	1260	0
3/28/61	0.4*	87	47	1451	78	36	1560	25
6/ 5/61	0.4*	103	55	1718	111	38	2220	0
	Average			1231			1955	

Failure to meet Compact requirements
for Suspended Solids removal - 7/14 visits

Failure to meet Compact requirements
for Coliform removal - 0/14 visits

* Estimated

HIGHLANDS, NEW JERSEY

The Highlands treatment plant was built in 1928 to accommodate a design flow of 1.2 mgd. The treatment consists of sedimentation plus chlorination. The treatment units are a bar rack, sedimentation tank, chlorination with a contact tank, and glass-covered sludge beds. The original outfall line traversed the Shrewsbury River and the neck of land connecting Sandy Hook to the mainland, and entered the Atlantic Ocean. This outfall line was reported to be broken sometime in the past and, according to the records of the Interstate Sanitation Commission, the effluent is presently being discharged to the Shrewsbury River. The estimated population served is approximately 3,000 persons during the winter and upwards of 6 to 12,000 during the peak summer months. This is approaching the designed capacity of the existing plant. The 1960 Census population for this area is 3,536. Average flow during the winter months is approximately 0.4 mgd.

Inspections by the ISC, since 1958, have shown that the plant failed to comply with the Compact suspended solids removal requirement on 7 occasions out of the 14 visits made by the Commission staff. Removals ranged from a low of 42% on September 20, 1960 to a high of 82% on June 7, 1959. The coliform requirements of the Commission were met on every occasion. The Interstate Sanitation Commission records also indicate that the flow meter and totalizer have been out of order since prior to their April 30, 1958 visit. The records of the ISC indicate that the system is a separate system with no known by-pass.

ATLANTIC HIGHLANDS SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/30/58		48	45		61	33		0
6/17/58	0.510	57	33	1212	105	0	2680	0
10/ 7/58	0.277	39	69	450	118	7	2678	0
5/ 7/59	0.300*	75	19	938	112	0	1680	0
7/ 1/59	0.369	107	17	1646	184	0	3395	25
8/26/59	0.355	107	16	1585	154	6	2735	75
11/ 4/59	0.226	130	11	1226	102	27	1155	25
5/18/60	0.667	38	69	1061	83	34	2768	0
8/ 1/60	0.502	33	75	688	120	10	3012	0
8/22/60	0.5*	41	61	854	No Samples Taken			
9/21/60	0.5*	121	0	2522	100	0	2500	100
9/27/60	0.5*	65	54	1355	113	7	2825	75
3/29/61	0.5*	40	30	834	67	16	1675	0
5/ 9/61	0.741	19	77	396	66	35	2445	0
	Average			1136			2462	

Failure to meet Compact requirements
for Suspended Solids removal - 9/14 visits

Failure to meet Compact requirements
for Coliform removal - 3/13 visits

* Estimated

ATLANTIC HIGHLANDS, NEW JERSEY

Atlantic Highlands treatment plant was built in 1928 for a design flow of 0.6 mgd, providing sedimentation and chlorination. The treatment units consist of a sedimentation tank, chlorination in the wet well on the effluent line, and glass-covered sludge beds. The outfall from this plant enters Sandy Hook Bay next to a private marina dock and discharges approximately 1,000 feet off shore. The 1960 estimated population served is approximately 3,000 persons during the winter months with approximately double this number served during the peak summer months. The 1960 Census for Atlantic Highlands shows a population of 4,119. The average flow during the winter months is estimated at 0.4 mgd.

Inspections by the ISC since 1958 show the plant failed to meet the Compact Standard for suspended solids removal during 9 of the 14 visits that the Commission staff made. The removals ranged from a low of a negative removal on September 1, 1960, to a high of 77 % on May 9, 1961. The plant has failed to meet the coliform requirements of the Commission on 3 occasions during the 14 visits. The plant is operated by a part time operator, and according to the Interstate Sanitation Commission records, the operator was not present during 2 of the 14 visits made by the Commission staff. On various occasions the Commission staff has reported that no operation records were available at the plant. The tide backs the flow of the treated effluent into the wet-wall necessitating pumpage during periods of high tide. The pump on the effluent line was out of operation from December 12, 1960 through March 28, 1961. During that time a portable pump was used to pump the effluent during periods of high tide. Records of the ISC indicate that this is a separate system with no known by-passes. A by-pass at the plant is located in a manhole in the street opposite the plant. This manhole has been well sealed with an accumulation of paving material over the years, indicating that this by-pass has not been used. This plant is operating at or near its design capacity during the peak summer season.

LEONARDO SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
7/ 8/58	0.015*	11	71	6.9	16	36	12	75
6/30/59	0.015*	13	92	8.1	15	92	11	25
6/30/60	0.015	------------No Samples Taken--------------						100
1961	No visits so far							
	Average			7.5			12	

Failure to meet Compact requirements
for Suspended Solids removal - 0/2 visits

Failure to meet Compact requirements
for Coliform removal - 2/3 visits

* Estimated

U. S. NAVAL AMMUNITION DEPOT, LEONARDO, NEW JERSEY

The Leonardo Naval Depot sewage treatment plant was constructed during the 1940's and consists of sedimentation, filtration, and chlorination with a design flow of 0.08 mgd. The treatment units are pre-chlorination facilities, Imhoff tank, intermittent sand filters (out of operation since 1949), and sludge beds. The effluent from the treatment plant discharges to Ware Creek at its confluence with Raritan Bay. The estimated population served at the present time is approximately 130 persons. The ISC has made 3 visits to this plant since 1958. The plant has met the suspended solids requirement of the Compact on each occasion tested, but has failed to meet the coliform requirement on 2 of the 3 visits.

There are 3 pier facilities on this base with privies located on each of the piers. These facilities discharge over pierside without treatment. The approximate population using these facilities is 100 persons, with a maximum of 250. Discussions are being held with the Naval District in charge to obtain compliance with local regulations.

KEANSBURG SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
		Eff.	Percent	Eff.	Eff.	Percent	Eff.	% over
	Mgd.	PPM	Removed	P.E.*	PPM	Removed	P.E.*	1/ml
4/23/58	1.57	115	0	7351	36	18	2825	100
6/24/58	1.53	116	15	7401	56	59	4285	75
10/28/58	1.84	104	18	7980	44	19	4050	100
5/ 6/59	1.37	79	24	4512	41	46	2809	50
6/24/59	1.44	831	70	49000	93	57	6695	75
8/25/59	1.66	77	64	5329	110	39	9130	0
11/17/59	1.27	71	21	3757	38	40	2413	67
5/25/60	1.19	92	22	4566	55	27	3272	75
8/ 1/60	3.11	81	39	10504	78	44	12129	75
8/23/60	2.74	117	12	13368	No Samples Taken			75
10/ 4/60	1.38	66	45	3798	26	62	1794	50
3/21/61	1.82	56	19	4250	41	27	3731	100
5/10/61	1.45	97	0	5865	51	25	3697	50
	Average			9822			4736	

Failure to meet Compact requirements
for Suspended Solids removal - 11/13 visits

Failure to meet Compact requirements
for Coliform removal - 9/13 visits

* Estimated

KEANSBURG, NEW JERSEY

The Keansburg treatment plant was rebuilt in 1949 to accommodate a design flow of 2.0 mgd providing sedimentation plus chlorination facilities. The treatment units consist of screens, mechanically-equipped sedimentation tanks, post-chlorination facilities, chemical flocculation and sludge digester with vacuum filtration. The outfall line discharges into Raritan Bay, approximately 1500 feet offshore from the city of Keansburg. The estimated population served is approximately 5600 persons during the winter months, with a summer population reaching 3 to 4 times this total during the peak months. The average flow during the winter months is approximately 1.4 mgd. Flows as high as 3.1 mgd have been noted in the ISC records. The 1960 Census population for this community is 6,854.

Inspections by the Interstate Sanitation Commission staff, since 1958, have shown that this plant has failed to meet the Compact requirements for suspended solids removal on 11 of 13 plant visits. The suspended solids removals have ranged from a low of negative removals on 2 occasions to a high of 70% on June 24, 1959. With respect to the coliform standard of the Commission, the plant has failed to meet the standard on 9 of the 13 plant visits. Of the 4 visits on which the requirements were met, 3 of these had borderline performances. The records of the Commission note that on May 6, 1959 sludge stored in the digester was hauled away after 2 years of storage. On the occasion of the ISC visit of June 24, 1959 iron wastes were being dumped into the treatment plant at so great a rate that the pumps in the plant could not handle the flow and the plant was observed to be overflowing during the morning sampling period. On that occasion the influent suspended solids was recorded at 2,737 ppm and the effluent at 831 ppm. There is no State licensed operator at this plant, although there is a full time employee designated as the Chief Operator. The records of the Interstate Sanitation Commission indicate that this is a separate gravity system having no known by-passes. This plant is operating over its design capacity during the summer months.

KEANSBURG, NEW JERSEY

The Keansburg treatment plant was rebuilt in 1949 to accommodate a design flow of 2.0 mgd providing sedimentation plus chlorination facilities. The treatment units consist of screens, mechanically-equipped sedimentation tanks, post-chlorination facilities chemical flocculation and sludge digester with vacuum filtration. The outfall line discharges into Raritan Bay, approximately 1500 feet offshore from the city of Keansburg. The estimated population served is 5600 persons during the winter months, with a summer population reaching 3 to 4 times this total during the peak months. The average flow during the winter months is approximately 1.4 mgd. Flows as high as 3.1 mgd have been noted in the ISC records. The 1960 Census population for this community is 6,854.

Inspections by the Interstate Sanitation Commission staff, since 1958 , have shown that this plant has failed to meet the Compact requirements for suspended solids removal on 11 of 13 plant visits. The suspended solids removals have ranged from a low of negative removals on 2 occasions to a high of 70% on June 24, 1959. With respect to the coliform standard of the Commission, the plant has failed to meet the standard on 9 of 13 plant visits. Of the 4 visits on which the requirements were met, 3 of these had borderline performances. The records of the Commission note that on May 6, 1959 sludge stored in the digester was hauled away after 2 years of storage. On the occasion of the ISC visit of June 24, 1959 iron wastes were being dumped into the treatment plant at so great a rate that the pumps in the plant could not handle the flow and the plant was observed to be overflowing during the morning sampling period. On that occasion the influent suspended solids was recorded at 2,737 ppm and the effluent at 831 ppm. There is no State licensed operator at this plant, although there is a full time employee designated as the Chief Operator. The records of the Interstate Sanitation Commission indicate that this is a separate gravity system having no known by-passes. This plant is operating over its design capacity during the summer months.

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KEYPORT SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/23/58	0.800	68	49	2268	111	8	4440	
6/25/58	0.9	104	25	3903	173	14	7785	25
10/22/58	0.8*	103	43	3436	184	16	7360	75
5/13/59	0.8	53	73	1768	121	27	4840	100
6/30/59	0.8	61	61	2035	165	34	6600	50
8/26/59	0.8*	104	38	3469	176	25	7050	75
11/18/59	0.8*	68	76	2268	103	53	4120	67
6/ 1/60	0.8*	77	55	2568	157	22	6280	100
8/ 2/60	0.8*	27	63	900	106	29	4240	25
8/23/60	0.8*	71	37	2368	No Samples Taken			75
9/28/60	0.8*	53	51	1768	104	20	4160	100
3/15/61	0.8*	51	41	1701	93	18	3720	100
5/10/61	0.8*	51	46	1701	122	23	4880	100
	Average			2319			5456	

Failure to meet Compact requirements
for Suspended Solids removal - 9/13 visits

Failure to meet Compact requirements
for Coliform removal - 9/12 visits

* Estimated

KEYPORT, NEW JERSEY

The Keyport treatment plant was rebuilt in 1936 to accommodate a design flow of 0.4 mgd providing sedimentation plus chlorination. Treatment units consist of a bar rack, sedimentation tank, chlorination facilities including a contact tank, sludge digestion facilities, glass-covered sludge drying beds. The outfall line discharges approximately 25 feet offshore into Raritan Bay. The estimated population served is approximately 7,000 persons during the winter months and upwards to 3 times this figure during the summer months. The 1960 Census for this area gives a population of 6,440 persons. Average flow during the winter months is approximately .8 mgd. The population served during the winter months is 100% in excess of the designed population of this plant and the flow is 300% in excess of the designed flow during the peak summer months.

Inspections of the Interstate Sanitation Commission have shown that this plant failed to meet the suspended solids requirement of the Commission on 9 of 13 plant visits. Suspended solids removal have ranged from a low of 25 % on June 25, 1958, to a high of 76% on November 18, 1959. The plant has failed to meet the Commission coliform standards on 9 of 12 occasions. Records of the Commission indicate that the plant is in very poor condition and is subject to flooding by tidal action. The digesters have been completely out of operation for some time and the sludge beds have not been used for a period of 2 or more years. The greenhouse is in poor repair with much of the glass broken. During the Commission visit of May 10, 1961 the bar screen was under water during the entire visit and the records indicated that raw sewage had been by-passed through an outfall line on Front Street for a period from May 2 through May 9. The south Keyport pump station was noted as by-passing on April 26. Both of these by-passes were made with the permission of the New Jersey State Health Department. During a visit on April 28, 1961 by the staff of the Interstate Sanitation Commission it was noted that the flow meter was out of operation. The flights for the sedimentation tank had been out of operation since April 13. A septic tank scavenger was removing sludge from the tanks during the period of the visit, the sludge digestion tanks were under water, the chlorine contact tank contained a large quantity of sludge and gas bulking was observed. The grit chamber-bar rack was surcharged with a flow of water approximately 6" above the tops of the bar rack. The plant was being operated by an inexperienced man from the City Highway Department. The operator was attempting to do the best he could, but was unprepared for the situation that faced him.

An examination of the sewage system records of the Interstate Sanitation Commission indicates that this is a separate system having 3 pumping stations. One pumping station is equipped with a by-pass overflow arrangement. This is the pump station previously reported as by-passing.

The State has this plant under orders and it is proposed to completely rebuild this plant. A project has been submitted under the Construction Grants Program--PL 87-88 for a grant for the construction of a sewage treatment plant. Additions and improvements estimated at $363,500 are proposed. A Federal grant of $108,600 has been accepted. The bids were received in May 1961.

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MATAWAN TOWNSHIP (RIVER GARDENS SECTION) SEWAGE TREATMENT PLANT, NEW JERSEY

The Matawan Township sewage treatment plant was designed to accommodate a flow of 0.25 mgd, providing contact aeration and chlorination. The treatment units consist of a sedimentation tank with contact aeration and post-chlorination facilities with a contact tank, sludge digester and sludge beds. The effluent is discharged to Matawan Creek approximately 1/2 mile upstream from the confluence of Matawan Creek with Raritan Bay. The estimated populations served is approximately 280 families or about 1,000 persons with an average flow of approximately 0.13 mgd.

During a visit by the State Health Department representative on April 20, 1961 it was noted that the flow meter was out of order and the second stage aeration tank was not functioning properly. The operator is a part-time man putting in approximately two hours per day and the plant has suffered in the past from vandalism. It is our understanding that the Township plant is under orders of the State and that the matter has been referred to the New Jersey Attorney General's office. No information was available on the current performance of this plant nor was any information available on the sewer system as to whether there are any known by-passes.

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KNOLLCROFT SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

<table>
<tr><th>DATE</th><th>FLOW</th><th colspan="3">SUSPENDED SOLIDS</th><th colspan="3">B.O.D. (5 day)</th><th>COLIFORM</th></tr>
<tr><th></th><th>Mgd.</th><th>Eff. PPM</th><th>Percent Removed</th><th>Eff. P.E.*</th><th>Eff. PPM</th><th>Percent Removed</th><th>Eff. P.E.*</th><th>% over 1/ml</th></tr>
<tr><td>6/12/61</td><td colspan="7">-----------------No Samples Taken------------------</td><td>100</td></tr>
</table>

Failure to meet Compact requirements
for Coliform removal - 1/1 visits

* Estimated

MATAWAN TOWNSHIP (KNOLLCROFT SECTION) SEWAGE TREATMENT PLANT, NEW JERSEY

The Knollcroft treatment plant was completed early in 1960 to accommodate a design flow estimated at 0.2 mgd providing sedimentation plus chlorination. The treatment units consist of a bar rack, sedimentation tank and chlorination facilities including a contact chamber. The discharge is to an outfall line running 1,000' off the shore into Raritan Bay. The present population served is estimated at about 850 persons in the housing development called Knollcroft.

The Interstate Sanitation Commission made its first visit to this plant on June 12, 1961 and at that time found the coliform removal to be in violation of the Compact standard. This has been the only sampling of this plant and only one coliform series was tested. No information was available as to known by-passes.

SAYREVILLE-MORGAN SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/24/58	0.100	--------------No Samples Taken---------------						0
9/23/58		" " "						0
6/18/59	0.074	" " "						0
9/17/59	0.113	" " "						0
12/ 3/59	0.094	" " "						0
6/30/60		" " "						0
8/24/60	0.156	75	78	488	No Samples Taken			0
6/12/61	0.110	43	86	197	164	38	900	0
	Average			343			900	

Failure to meet Compact requirements
for Suspended Solids removal - 0/2 visits

Failure to meet Compact requirements
for Coliform removal - 0/8 visits

* Estimated

SAYREVILLE (MORGAN SECTION) SEWAGE TREATMENT PLANT, NEW JERSEY

The Morgan sewage treatment plant was built in 1951 to accommodate a design flow of 0.3 mgd providing sedimentation plus chlorination. The treatment units consist of a bar rack, mechanically-operated sedimentation tank, sludge digesters, and chlorination facilities including a contact tank. The outfall line discharges into Raritan Bay approximately 600' offshore at the confluence of Cheesequake Creek and Raritan Bay. The estimated population served is approximately 2,000 and the average flow is estimated at approximately 0.1 mgd.

The inspections of the Interstate Sanitation Commission have shown that this plant has consistently met the coliform requirements of the Commission on all occasions. The plant has been sampled eight times in the last four years. During 1960 and 61 the plant was sampled once each year to determine Compact requirements on suspended solids. On both occasions the plant met the Compact requirements with removals of 78 and 86 per cent respectively in 1960 and 61. No information was available as to known by-passes.

SOUTH AMBOY SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/ 6/58	0.735	56	66	1716	81	38	2975	0
6/30/58	0.595	67	74	1664	114	52	3390	25
10/21/58	0.600*	62	65	1551	147	40	4410	0
5/ 5/59	0.575	69	69	1655	180	35	5175	0
6/23/59	0.600*	66	70	1651	140	44	4200	0
9/ 1/59	0.600*	91	55	2277	156	11	4680	25
11/ 1/59	0.600*	65	69	1626	136	26	4080	25
6/ 7/60	0.56*	62	74	1447	178	39	4984	25
8/ 2/60	0.6*	46	75	1150	143	24	4290	25
8/24/60	0.6*	67	66	1676	No Samples Taken			0
10/19/60	0.6*	53	72	1326	147	23	4410	25
5/ 8/61	0.6*	23	87	575	137	28	4110	25
6/13/61	0.6*	50	69	1251	154	25	4620	25
	Average			1505			4277	

Failure to meet Compact requirements
for Suspended Solids removal - 1/13 visits

Failure to meet Compact requirements
for Coliform removal - 0/13 visits

* Estimated

SOUTH AMBOY SEWAGE TREATMENT PLANT, NEW JERSEY

The South Amboy sewage treatment plant was built in 1940 to accommodate a design flow of 1.0 mgd providing sedimentation plus chlorination. The treatment units consist of a bar rack, two mechanically equipped circular sedimentation basins, chlorination facilities including contact tank, sludge digester and glass-covered sludge beds. The outfall line discharges offshore into Raritan Bay. The estimated population served is 8,400 persons with an average flow of 0.7 mgd. The 1960 Census population for South Amboy was 8,422 persons.

Inspections by the Interstate Sanitation Commission since 1958 have shown that the South Amboy plant has met suspended solids removal requirements on 12 of the 13 occasions of a plant visit. The only failure to meet Compact requirements was on September 1, 1959, at which time the removal efficiency was 55%. The removals over the past 4 years have ranged from a low of 55% to a high of 87% during the visit of May 8, 1961. The South Amboy plant has met the coliform requirements of the Commission on every visit by the Commission staff during this past 4 years. The records of the Commission also noted that the South Amboy plant had by-passed for a period of time on or about June 30, 1958 while the clarifiers were undergoing repair. Again, in May of 1960, on or about May 16 to May 20, the plant by-passed to allow for the repair of the chlorine detention chamber. Again, on May 8, 1961, the Commission noted that the plant was by-passing for a period from March 6, 1961 to April 17, 1961 while repairs to the pumps and piping as well as cleaning of the settling tanks were under way. The Interstate Sanitation Commission records indicate that the South Amboy sewer system is a separate system with 5 pumping stations, none having built-in by-passes.

SAYREVILLE-MELROSE SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/24/58	0.038*	-------------No Samples Taken--------------						0
9/23/58	0.045	" " "						0
6/18/59	0.030	" " "						0
9/17/59	0.019	" " "						0
12/ 3/59	0.017	" " "						0
6/30/60		" " "						0
8/24/60	0.042	58	68	100	No Samples Taken			0
4/ 4/61	0.045	56	33	104	74	48	185	0
	Average			102			185	

Failure to meet Compact requirements
for Suspended Solids removal - 1/2 visits

Failure to meet Compact requirements
for Coliform removal - 0/8 visits

* Estimated

SAYERVILLE (MELROSE SECTION) TREATMENT PLANT, NEW JERSEY

The Melrose treatment plant was built in 1949 to accommodate a design flow of 0.1 mgd, providing sedimentation plus chlorination. The treatment units consist of a bar rack, mechanically-equipped sedimentation tank, chlorination facilities with a contact tank, sludge digester, and glass-covered sludge beds. The outfall discharges to the Raritan River upstream of the Garden State Parkway Bridge. The estimated population served is a thousand persons with an average flow of approximately 0.05 mgd.

Inspections by the Interstate Sanitation Commission since 1958 have shown that the plant has failed to meet the suspended solids removal requirements of the Compact on 1 of the 2 occasions during which the plant was sampled for suspended solids. This was a removal of 33% recorded on April 4, 1961. On August 24, 1960 the removal was recorded at 68%. The plant has met the Commission standards for coliform removal on every occasion during the last 4 years - a total of 7 plant visits. No information was available as to known by-passes.

MIDDLESEX COUNTY SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
6/30/58	29.77	50	84	62070	385	0	573073	0
10/8/58	34.1	62	80	88162	387	7	659835	0
4/22/59	36.9	106	64	163105	367	17	677115	25
6/16/59	39.9	107	62	178030	412	6	821940	25
8/25/59	40.0*	165	81	275220	503	26	1006000	0
10/28/59	46.71	110	67	214258	444	16	1036962	25
12/16/59	43.21	77	71	138736	369	18	797224	0
5/11/60	42.87	95	74	169829	475	13	1018163	0
8/ 2/60	52.08	36	77	78182	355	11	924420	25
8/23/60	50.37	172	19	361273	No Samples Taken			0
10/15/60	41.83	74	75	129079	375	16	784312	0
12/ 6/60	37.8	155	58	244320	493	10	931770	0
3/22/61	55.4	72	68	166332	291	21	806070	25
6/ 7/61	50.0*	63	76	131355	344	10	860000	0
	Average			171425			838222	

Failure to meet Compact requirements
for Suspended Solids removal - 2/14 visits

Failure to meet Compact requirements
for Coliform removal - 0/14 visits

* Estimated

MIDDLESEX COUNTY SEWAGE TREATMENT PLANT, NEW JERSEY

The Middlesex County sewage treatment plant was built in 1957 to accommodate a design flow of 52.0 mgd. The treatment consists of sedimentation, chemical treatment and chlorination. The treatment units are a bar rack, a grit chamber, chemical distribution chamber, clarriflocculators and chlorination facilities including a contact chamber with sludge storage and sludge digestion with disposal of sludge to the sea. The outfall line discharges to Raritan Bay approximately 7500' offshore through a series of 4 dispersion nozzles. The estimated population served by this plant is 299,410, served by trunk sewers. This includes 13 municipalities and 8 industries in the area. Average daily flow for 1960 was approximately 41 mgd.

Inspections by the Interstate Sanitation Commission staff since the beginning of operation, 1958, have shown the plant failed to meet Compact suspended solids requirements on 2 occasions during a total of 14 visits. The suspended solids removal has ranged from a low of 19% on August 23, 1960 to a high of 84% on June 30, 1958. The plant has met the ISC coliform requirements on every occasion during the last 14 visits. The records also indicate that for a period of 2 weeks, from February 14 to February 28, 1961, it was necessary to by-pass approximately 2 mgd for a total of 28 mgd at the Heyden Pumping Station because of a broken valve at this station.

Although the system is a combined system in that it takes both sewage and storm water flow, the plant is equipped to take the full storm discharge without necessity for by-passing of treatment facilities. By-passing of the treatment plant is possible from the grit chamber directly to the post-chlorination chamber. Records of the ISC indicate 3 pumping stations, 2 small ones with no known by-passes, and the main pump station with 2 by-passes. This plant is operating at its designed capacity and during times of storm it has operated at flows considerably in excess of design.

CAMP KILMER, NEW JERSEY

Camp Kilmer is located on the Raritan River near New Brunswick, N. J. The treatment facilities at this plant consist of high rate filtration, sludge digestion, and chlorination. The average flow is 1.0 mgd and the capacity of the plant is rated at 6.0 mgd. The discharge from this plant goes to the Raritan River.

Inspection by the State Health Department has shown the effluent to be satisfactory with the exception of coliform organisms. Discussions are being held with the federal agency concerned by the Public Health Service Regional office to remedy this problem.

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RARITAN ARSENAL, NEW JERSEY

Raritan Arsenal is located in Edison Township. The sewage treatment facility for this post provides primary settling, standard rate trickling filters, and sludge digestion and drying. A dry chlorinator is available but not in use. The capacity of the plant is 0.5 mgd., and the average flow is 0.25 mgd.

The State Health Department has found this plant to be satisfactory with the exception of the lack of chlorination. Discussions are being held with the federal agency responsible for this plant to see that there is compliance with the State requirements.

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WOODBRIDGE (KEASBY SECTION) SEWAGE TREATMENT PLANT, NEW JERSEY

The Woodbridge-Keasby sewage treatment plant was built to accommodate a design flow of 1.35 mgd providing sedimentation, and chlorination. The treatment units consist of a bar rack, grit chamber, mechanically equipped sedimentation tanks, chlorination with a contact tank, sludge digestion and sludge drying beds. The outfall discharges to Kinsey Creek which flows into the Raritan River upstream from Perth Amboy. The estimated population served is 2,000 persons.

No information is available as to the performance of this plant, at the time of the preparation of this report.

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PERTH AMBOY SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/22/58	5.75	113	36	27094	114	20	32775	100
7/ 1/58	5.7	27	87	6422	99	24	28200	25
10/ 4/58	5.32	49	76	10870	82	51	21800	0
4/21/59	5.79	56	67	13511	132	62	38215	50
6/17/59	4.12	39	69	6700	97	41	19982	0
7/ 9/59	4.58	79	63	15095	86	39	19700	75
8/26/59	6.43	61	62	16346	122	32	39225	0
12/ 8/59	6.64	53	58	14678	156	0	51800	25
5/10/60	7.60	85	46	26938	145	7	55100	0
8/ 2/60	6.91	9	92	2594	185	26	63918	0
8/22/60	5.46	62	61	14115	No Samples Taken			50
9/15/60	-----------------No Samples Taken---------------------------							
12/ 7/60	5.22	52	75	11319	126	25	32885	50
3/14/61	5.88	138	0	33831	55	0	16170	100
5/ 9/61	5.45	43	69	9772	104	66	28340	25
	Average			14949			34469	

Failure to meet Compact requirements
for Suspended Solids removal - 4/14 visits

Failure to meet Compact requirements
for Coliform removal - 3/14 visits

* Estimated

PERTH AMBOY SEWAGE TREATMENT PLANT, NEW JERSEY

The Perth Amboy sewage treatment plant was built in 1934 to accommodate a design flow of 10.0 mgd providing sedimentation, chemical flocculation and chlorination. The treatment units consist of a bar rack, chemical flocculation chamber, mechanically-equipped settling tanks with magnetite filters, chlorination facilities including a contact tank, and vacuum filtration of the raw sludge after sludge conditioning. The outfall line discharges approximately 200' offshore of the treatment plant site into the Raritan River at approximately the center of the bathing area of a public bathing beach of the city of Perth Amboy. The estimated population served is 42,000 persons with an average flow of approximately 7.0 mgd.

Inspections by the Interstate Sanitation Commission staff since 1958 have shown that the plant has failed to meet compact requirements on suspended solids removal on 4 occasions during the 15 visits of the Commission. The suspended solids removals have ranged from a low of a negative removal recorded on March 14, 1961 to a high of 92% recorded on August 2, 1960. The plant has also failed to meet the Compact requirements on coliform removal on 3 occasions during the last 15 visits of the Commission staff.

Records of the Interstate Sanitation Commission show that the plant was by-passed for a period of one week from September 21 to September 28, 1958 while the pumps were being repaired. During a visit of August 2, 1960 the Commission staff noted that bubbles were rising in the center portion of both clarifiers indicating a septic condition. It was also noted on this report that in the beginning of July a State inspector had reported recommending an extension of the outfall pipe. Furthermore, a lifeguard on the beach had said that several samples had recently been taken at the beach by the State inspectors. During a visit of May 9, 1961 the Commission staff said that the filters had started spilling over through the emergency relief passes recently built into the filters. During a visit on April 21, 1961 by the State inspector it was noted that one filter was out of operation due to clogging by industrial waste from a local paper company. It was also noted that this filter had been out of operation since April 5. These filters are by-passed by a series of relief pipes inserted in the circumference of the filter to allow the liquid to escape through the pipe rather than up-flow through the filter as the plant was designed.

The sewer system in Perth Amboy is a combined system with 18 leaping weir devices. These devices are set to by-pass all flows over 9 million gallons per day. By-passing has occurred from time to time during periods of storm.

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WOODBRIDGE-SEWAREN SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/ 9/58	5.9	35	78	8611	25	62	7375	
6/26/58	1.04	34	74	1476	82	34	4264	
10/22/58	----------------------No Samples Taken------------------------							
4/22/59	2.28	45	75	4278	59	56	6726	
7/ 2/59	1.25	41	60	2137		No Samples Taken		
8/27/59	1.11	38	79	1759	82	53	4551	
10/14/59	0.566	80	60	1888	76	19	2151	
12/10/59	0.903	42	68	1580	36	63	1625	
6/23/60	1.01	23	89	968	81	40	4091	
7/28/60	2.19	38	36	3470	56	23	6132	
8/25/60	3.91	27	71	4402		No Samples Taken		
10/20/60	3.66	63	79	9615	58	52	10614	
5/18/61	4.34	15	81	2714	17	71	3689	
	Average			3573			5122	

Failure to meet Compact requirements
for Suspended Solids removal - 0/12 visits

* Estimates

WOODBRIDGE (SEWERAN SECTION) SEWAGE TREATMENT PLANT, NEW JERSEY

The Woodbridge (Seweran) sewage treatment plant was built in 1954 to accommodate a design flow of 10.0 mgd. The treatment consists of sedimentation. The treatment units include a grit chamber, bar screens, aerated flocculation tanks, mechanically-equipped settling tanks, mechanical filters, chlorination equipment including chlorine contact tanks and vacuum filtration for sludge. The outfall discharges to Arthur Kill. The estimated population served is 21,000 persons. The plant serves a portion of Woodbridge Township. The remainder of the Township is sewered to the Rahway Valley Sewage Treatment Works or to the Woodbridge Township Sewage Treatment Plant at Keasby, New Jersey. Average flow for the plant is estimated at 2.2 mgd.

Inspections by the Interstate Sanitation Commission staff since 1958 have shown the plant to meet the Compact requirements for suspended solids removal. The plant is in the ISC Class "B" waters. Suspended solids removal of only 10% is required and no coliform removal is required. No chlorination was practiced during 1960 according to the ISC records. Woodbridge Township has a separate system with 6 pumping stations. None of the pumping stations have built-in by-passes.

CARTERET SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/29/58	2.18	82	86	7456	No Samples Taken			
7/28/58	1.63	110	66	7477	50	24	4080	
10/15/58	1.93	53	77	4266	50	62	4825	
4/22/59	2.17	172	79	15562	202	57	21915	
7/ 2/59	1.85	205	71	15638	No Samples Taken			
8/27/59	1.91	98	67	7798	292	54	27885	
11/10/59	1.93	91	59	7323	No Samples Taken			
6/23/60	1.72	69	50	4950	117	13	10062	
7/28/60	3.15	92	0	12093	69	3	10867	
8/25/60	3.0*	99	70	12384	No Samples Taken			
9/29/60	2.55	115	71	12228	114	8	14535	
3/30/61	3.12	51	53	6635	52	53	8112	
6/ 8/61	3.0*	37	83	4628	81	46	12150	
	Average			9111			12715	

Failure to meet Compact requirements
for Suspended Solids removal - 1/13 visits

* Estimated

THE CARTERET SEWAGE TREATMENT PLANT, NEW JERSEY

The Carteret sewage treatment plant was built in 1953 to accommodate a design flow of 3.0 mgd. The treatment consists of sedimentation. The treatment units include a bar rack, grit chambers, chemical flocculation tanks, mechanically-equipped settling tanks, sand filters and chlorination facilities, including a chlorine contact tank with vacuum filtration after sludge conditioning. The outfall discharges to the Arthur Kill. The estimated population served by this plant is 13,000 persons. The 1960 Census for Carteret shows a population of 14,603. The average flow is 2.4 mgd.

Inspections by the Interstate Sanitation Commission since 1958 have shown the plant has failed to meet Compact requirements for suspended solids removal on only 1 occasion in a total of 13 visits. The plant discharges to Class "B" waters of the Interstate Sanitation Commission. The standards for these waters are 10% removal of suspended solids and no chlorination is required. The sewer system is a combined system with 3 pumping stations. The 3 stations do not have built-in by-passes. The system, however, has 7 regulating chambers, 6 with outfalls to the Arthur Kill and the 7th with an outfall to the Rahway River. All regulators are controlled by float valves.

RAHWAY VALLEY SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
12/ 8/59	28.76	56	56	67160	104	19	149552	
6/23/60	20.45	44	72	37521	100	29	102250	
7/18/60	17.13	66	58	47145	84	53	71946	
8/10/60	16.92	74	60	52211	108	33	91368	
10/15/60	26.70	41	70	45640	135	4	180225	
4/ 5/61	27.86	49	72	36926	78	35	108654	
	Average			51102			117332	

Failure to meet Compact requirements
for Suspended Solids removal - 0/6 visits

* Estimated

RAHWAY VALLEY SEWAGE TREATMENT PLANT, NEW JERSEY

The Rahway Valley sewage treatment plant was constructed in 1928 to accommodate a design flow of 16.7 mgd. The treatment consists of sedimentation. Treatment units include bar racks, grit chamber, mechanically-equipped sedimentation basin sludge digestion with vacuum filtration and glass-covered sludge beds. The outfall of this treatment plant was recently extended to discharge to the Arthur Kill. The treatment plant serves an estimated population of 170,000 persons.

Inspections by the Interstate Sanitation Commission since the plant came within their jurisdiction in 1959 have shown that the plant has met Compact requirements for suspended solids removal on each of the 6 visits made by the Commission staff. The plant is located in Class"B" waters and, therefore, no chlorination is practiced except for odor control. The sludge is discharged to the Linden-Roselle plant for disposal by barging to sea. No information was available as to known by-passes.

LINDEN-ROSELLE SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/17/58	13.77	102	65	58568	247	27	170050	
6/19/58	11.94	96	64	47788	331	22	197600	
10/ 7/58	9.6	65	73	26021	363	14	174250	
5/ 5/59	11.41	90	62	42826	244	43	139200	
7/ 2/59	9.96	93	70	38614		No Samples Taken		
8/27/59	10.38	117	92	50642	411	37	213300	
12/ 2/59	11.65	101	75	49066	352	38	205000	
6/ 9/60	10.65	96	69	42634	473	5	251872	
7/18/60	9.03	92	63	34642	284	17	128226	
8/29/60	8.70	105	72	38092		No Samples Taken		
9/22/60	19.47	48	69	38971	83	32	80800	
4/16/61	14.08	118	55	69282	288	16	202752	
	Average			44762			176305	

Failure to meet Compact requirements
for Suspended Solids removal - 0/12 visits

* Estimated

LINDEN-ROSELLE SEWAGE TREATMENT PLANT

The Linden-Roselle sewage treatment plant was built in 1952 to accommodate a design flow of 12.5 mgd. Treatment consists of sedimentation. Treatment units consist of bar screens, grit chamber, mechanically-equipped settling tanks and sludge storage tanks with sludge disposal by barging to sea. The outfall line discharges to Arthur Kill. The estimated population served by this plant is 120,000. The average flow is 12.2 mgd. The plant influent includes a large tributary loading of industrial waste.

Inspections by the Interstate Sanitation Commission since 1958 have shown this plant to meet the Compact requirements for suspended solids removal on each of the 12 visits by the Commission staff. The plant is located in Class "B" waters and no chlorination is required. The Commission staff, however, has noted that this plant has by-passed on numerous occasions in the past. A record of these by-passes is as follows:

April 17, 1958	partial by-passing during rains
June 19, 1959	by-passing
June 23, 24, 25, 1960	by-passing due to power failure
September 12, 1960	by-passing due to hurricane for 8 hrs.
December 21, 1960	by-passing for 16 hrs
January 1, 1961	by-passed for 24 hrs due to high flow over 30 mgd

Linden-Roselle is, for the most part, a separate system with 2 pump stations and one regulator. Both pump stations contain emergency by-pass provisions. A regulator located on Morse's Mill Road contains emergency by-pass provisions. A regulator located on Morse's Mill Road contains a 48" outfall to Morse's Creek as of 1959. This plant is operating at or over its designed capacity as indicated by the frequency of its by-passes.

ELIZABETH JOINT MEETING SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
4/16/58	63.24	81	47	213605	148	26	467976	
6/16/58	36.6	94	50	143448	151	0	276350	
10/16/58	35.8	85	57	126893	187	16	330050	
3/19/59	54.4	65	61	147451	139	24	378100	
6/25/59	44.0	83	65	152288	147	27	323400	
9/ 2/59	90.8	41	71	155240	85	49	385900	
11/12/58	43.5	82	54	148744	117	30	254500	
5/26/60	50.6	57	68	120271	106	43	268200	
7/ 7/60	40.2	43	71	72082	151	7	303510	
7/18/60	34.42	85	62	122001	142	38	244380	
8/17/60	37.39	--------------Sample Lost-----------------						
5/11/61	61.8	75	57	193279	114	40	352260	
	Average			145027			325870	

Failure to meet Compact requirements
for Suspended Solids removal - 0/11 visits

* Estimated

ELIZABETH JOINT MEETING SEWAGE TREATMENT PLANT, NEW JERSEY

The Elizabeth Joint meeting treatment plant was built in 1937 to accommodate a design flow of 100 mgd. Treatment units include screens, grit chamber, mechanically-equipped sedimentation, and sludge storage with sludge disposed of by barging to sea. The outfall discharges to the Arthur Kill. The estimated population served is 475,000 persons. The average flow is approximately 52 mgd.

Inspections by the Interstate Sanitation Commission since 1958 have shown the plant to meet the Compact requirements for suspended solids removal on each of the 11 visits by the Commission staff. The plant discharges to Class "B" waters, and no chlorination is required. The Joint meeting plant serves 12 communities. With the exception of Elizabeth, the communities have separate systems with gravity flow. Elizabeth has 1 pump station and 8 regulating chambers. In case of surcharging, the pump station backs the flow up the main and out through the regulators which discharge to Arthur Kill at various locations.

WILLOWBROOK HOSPITAL SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/ 1/58	0.480	68	65	1361	266	13	6384	
8/25/58	0.524	71	72	1540	244	11	6400	
10/ 8/58	0.591	61	68	1501	250	2	7390	100
3/31/59		75	65		346	0		
6/29/59	0.713	79	66	2348	283	20	10091	
9/ 8/59	0.650	77	75	2085	258	36	8385	
11/24/59	0.632	70	55		222	0	7000	
5/ 5/60	0.710	72	66	2131	315	21	11182	
7/28/60	0.672	87	42	2430	335	5	11252	
8/11/60	0.64	71	74	1894	294	6	9408	
9/ 6/60	0.63	66	73	1733	321	24	10111	
6/ 1/61	0.647	74	65	2006	297	10	9607	
	Average			1903			9854	

Failure to meet Compact requirements
for Suspended Solids removal - 0/12 visits

* Estimated

WILLOWBROOK STATE SCHOOL, STATEN ISLAND

Willowbrook State School is served by a primary treatment plant built in 1941. The plant was designed to accommodate a flow of 0.6 mgd. Treatment consists of sedimentation. Discharge is through an outfall to Fresh Kills, at the junction of Fresh Kill with the Arthur Kill. The population served is estimated at 4,000 persons. Average flow is estimated at 0.6 mgd equal to the designed capacity of the plant.

The plant met the Compact requirements for suspended solids removal on all occasions. Since the plant discharges to Class "B" waters, chlorination is not required.

TOTTENVILLE SECTION OF STATEN ISLAND

Tottenville Section of Staten Island, comprising a drainage area of approximately 2600 acres, drains to both Arthur Kill and Raritan Bay. In 1960 the estimated population for this area was 8,250 persons. The New York City Department of Public Works estimates that at least half of this group discharge their wastes to individual sub-surface disposal systems. The wastes from the remainder, or about 4,000 persons, drains directly to the Arthur Kill and Raritan Bay through sewers without treatment. This raw sewage reaches Raritan Bay and Arthur Kill through several different sewer outlets.

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MOUNT LORETTO HOME SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/22/58***				No Samples Taken				100
5/22/58**				" " "				100
9/16/58**				" " "				100
5/28/59**				" " "				100
12/ 3/59**				" " "				100
8/ 3/60**				" " "				100
1961	No visits so far							

Failure to meet Compact requirements
for Coliform removal - 6/6 visits

* Estimated
** New
*** Old

MT. LORETTO HOME, STATEN ISLAND, N. Y.

Mt. Loretto Home has 2 sewage treatment facilities, built around 1937. These facilities were designed to accommodate a flow of 0.1 mgd. Both of these facilities consist of septic tanks. Discharge is to Raritan Bay. The system serves a population of approximately 1,000 children and 200 adults. There are 4 separate septic tanks, each with a capacity of 22,500 gallons. HTH solution is applied to the effluent of 3 of these tanks. The 4th tank is not chlorinated. Average flow is estimated at .09 mgd.

Inspections by the Interstate Sanitation Commission indicate that the plant has failed to meet Compact requirements for coliform removals on every occasion during the 6 visits made by the Commission staff.

MARIST NOVITIATE, STATEN ISLAND

The home of the Marist Novitiate on Bayview Avenue in Staten Island is served by two small septic tanks which discharge to Lemon Creek a small tributary to Raritan Bay. The plant serves an estimated 35 persons in the home. No other information is available.

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RICHMOND MEMORIAL HOSPITAL SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/22/58			-----------------No Samples Taken------------------					100
9/16/58			" " "					100
5/28/59			" " "					100
12/ 3/59			" " "					100
8/ 3/60			" " "					100
1961	No visits so far							

Failure to meet Compact requirements
for Coliform removal - 5/5 visits

* Estimated

RICHMOND MEMORIAL HOSPITAL, STATEN ISLAND

Richmond Memorial Hospital is served by a septic tank built in 1936 with a capacity of 10,000 gallons. There is, in addition, a 500 gallon baffled contact tank. HTH is added once daily to the chlorine contact tank. The hospital has 160 beds and approximately 100 workers. In addition, 6 to 8 houses are also tied into these systems to give a population served of approximately 300.

Inspections by the Interstate Sanitation Commission have indicated that this plant failed to meet Compact coliform requirements on each of the 5 visits made by the Commission staff.

S. S. WHITE DENTAL COMPANY, STATEN ISLAND

The S. S. White Dental Company is served by a chlorination contact tank. Population served is approximately 700 persons. Discharge is to Raritan Bay. HTH is used for chlorination. Industrial wastes containing chromates and cyanide are also discharged to the bay. No information is available as to performance of this plant.

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SAINT JOSEPH'S HOME SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/22/58	------------	------------	------------	No samples Taken	------------	------------	------------	------------
7/ 2/59				" " "				
8/ 3/60				" " "				100
1961	No visits so far							

Failure to meet Compact requirements
for Coliform removal - 1/1 visits

* Estimated

ST. JOSEPH'S HOME, STATEN ISLAND

St. Joseph's Home has 5 septic tanks and serves approximately 40 persons in the winter and 200 during the summer months. The plant failed to meet the Commission coliform requirements on the one visit recorded by the Commission staff during the past 4 years. The effluent is discharged to Raritan Bay.

OAKWOOD BEACH SEWAGE TREATMENT PLANT
SUMMARY OF PERFORMANCE
FROM
INTERSTATE SANITATION COMMISSION RECORDS

DATE	FLOW	SUSPENDED SOLIDS			B.O.D. (5 day)			COLIFORM
	Mgd.	Eff. PPM	Percent Removed	Eff. P.E.*	Eff. PPM	Percent Removed	Eff. P.E.*	% over 1/ml
5/7/58	16.80	26	77	18214	12	69	10080	75
7/9/58	11.00	35	71	16054	10	88	5500	0
8/20/58	7.63	13	87	4136	10	83	3815	25
11/19/58	8.56	71	34	25345	10	89	4280	100
3/18/59	10.38	36	59	15583	28	64	14530	25
6/17/59	8.0*	29	74	9674	22	74	8800	25
7/14/59	8.0*	22	84	7339	25	79	10000	0
9/30/59	8.15	22	85	7477	27	85	11000	0
5/ 3/60	9.70	26	72	10516	29	61	14065	0
6/ 2/60	8.00	22	87	7339	25	80	10000	0
7/19/60	8.04	8	95	2682	26	72	10452	0
8/10/60	10.16	----------------Samples Lost--------------						25
11/15/60	8.93	16	84	5958	18	75	8037	25
4/11/61	14.7	23	73	14098	23	79	16905	50
5/16/61	13.9	17	78	9853	17	67	11815	50
	Average			11019			9949	

Failure to meet Compact requirements
for Suspended Solids removal - 2/14 visits

Failure to meet Compact requirements
for Coliform removal - 2/14 visits

*Estimated

OAKWOOD BEACH SEWAGE TREATMENT PLANT, STATEN ISLAND

The Oakwood Beach sewage treatment plant was built in 1956 to accommodate a design flow of 15.0 mgd. Treatment consists of high rate activated sludge and chlorination. Treatment units are a bar rack, grit chamber, aeration tanks, mechanically-equipped secondary tanks, chlorination, sludge thickening, sludge digestion with sludge disposal by barging to sea. The estimated population served by this plant is 85,000 persons. The average flow is approximately 10 mgd.

Inspections by the Interstate Sanitation Commission since 1958 have shown that the plant failed to meet Compact standards for suspended solids removal on 2 occasions during the 14 visits to this plant. Similarly, on 2 occasions the plant failed to meet the coliform removal requirements of the Commission on a total of 15 visits to the plant. Suspended solids removal have ranged from a low of 34% on November 19, 1958 to a high of 95% removal on July 19, 1960. The system is reported to be a separate system.

APPENDIX B

SEWAGE TREATMENT PLANTS TRIBUTARY TO THE RARITAN-LOWER BAY AND ARTHUR KILL STUDY AREA

KEY TO TREATMENT CODE

KEY TO TREATMENT CODE

A - Aeration
B - Sludge bed
C - Settling tank
D - Digester (separate sludge)
E - Chlorination
F - Filters
G - Grit chamber
H - Sludge storage tank (not second stage digestions units)
K - Chemical treatment
S - Screens
T - Sludge thickener
V - Mechanical sludge dewatering
X - Sludge disposal
Z - Sludge conditioning

NEW YORK APPENDIX A

EVALUATION OF POLLUTION CONDITIONS IN THE ARTHUR KILL

NY- A-1

APPENDIX NEW YORK - A

EVALUATION OF POLLUTION CONDITIONS IN THE ARTHUR KILL

The Arthur Kill is a tidal strait, 13 miles in length, connecting Newark Bay at Elizabethport with Raritan Bay at Tottenville. It separates Union and Middlesex Counties of New Jersey from the western shore of Staten Island. Because of its use for navigation by fairly large vessels, such as oil tankers, a channel 30 to 35 feet deep and from 400 to 800 feet wide has been dredged throughout the length of the Kill.

In considering the tidal and pollutional characteristics of the Kill, it has been found convenient to separate it into two zones, the dividing line being the southern end of the Fresh Kills Reach (Chart 286, U.S.C. & G.S.). The northern zone is comparatively narrow, connects with the polluted waters of Newark Bay and receives the major portion of the pollution discharging directly into the Arthur Kill. The southern zone is fairly wide, receives a lower pollutional load and terminates in the less polluted Raritan Bay.

A consideration in such separation is that the Fresh Kills area represents the limits of the tidal excursions from Newark Bay and Raritan Bay waters into the Arthur Kill. Pollution discharging into the Fresh Kills area therefore experiences difficulty in being carried out of the Kill through either the northern or southern route, and so a greater portion of its ultimate oxygen demand is exerted in the Kill.

The dimensional and tidal characteristics of the Kill are presented in Table 1. It is significant that the more highly polluted northern zone possesses only one-third of the total water surface in contact with the atmosphere for reaeration. Furthermore, the northern zone has greater average depth, hence tidal circulation is less effective in removing pollution.

It should be noted that there is little fresh water drainage into the Kill to aid in its circulation. Net flow out of the Kill, therefore, is comprised substantially of the flows associated with waste discharges.

The Interstate Sanitation Commission has classified the Arthur Kill as Class B waters except for the small portion of the Kill south of Outerbridge which is Class A.

History of Arthur Kill

The annual Harbor Pollution Survey of the City of New York has regularly included sampling the waters of the Arthur Kill since 1926. Samples for analysis are taken from near the water surface and several feet above the bottom during the summer, usually from mid-June to mid-September.

Table 1

DIMENSIONS AND TIDAL CHARACTERISTICS OF THE ARTHUR KILL

Characteristic	Arthur Kill	Tottenville to Fresh Kills	Fresh Kills to Elizabeth
Length, miles	13	6	7
Area, sq. ft.	124,000,000	80,000,000	44,000,000
Volume, cu. ft., low water	2,170,000,000	1,230,000,000	940,000,000
Volume, cu. ft., high water	2,790,000,000	1,640,000,000	1,150,000,000
Tidal prism, cu. ft.	620,000,000	410,000,000	210,000,000
Tidal range, ft.	4.9	5.1	4.8
Duration of flood, hrs.	6.5	-	-
Duration of ebb, hrs.	5.9	-	-
Tidal circulation, days	-	1.80	2.57

Tidal lag at Elizabeth 0.7 hours after Tottenville.

The sampling points, from south to north, are as follows:

1. Tottenville, near the southern end of the Kill.

2. Fresh Kills, near the mid-point of the Kill.

3. B&O Drawbridge, near the northern end of the Kill in the vicinity of the outfall of the Elizabeth-Joint Meeting plant.

4. Shooters Island, just outside the Kill in Newark Bay, which is useful in evaluating the waters at the northern end.

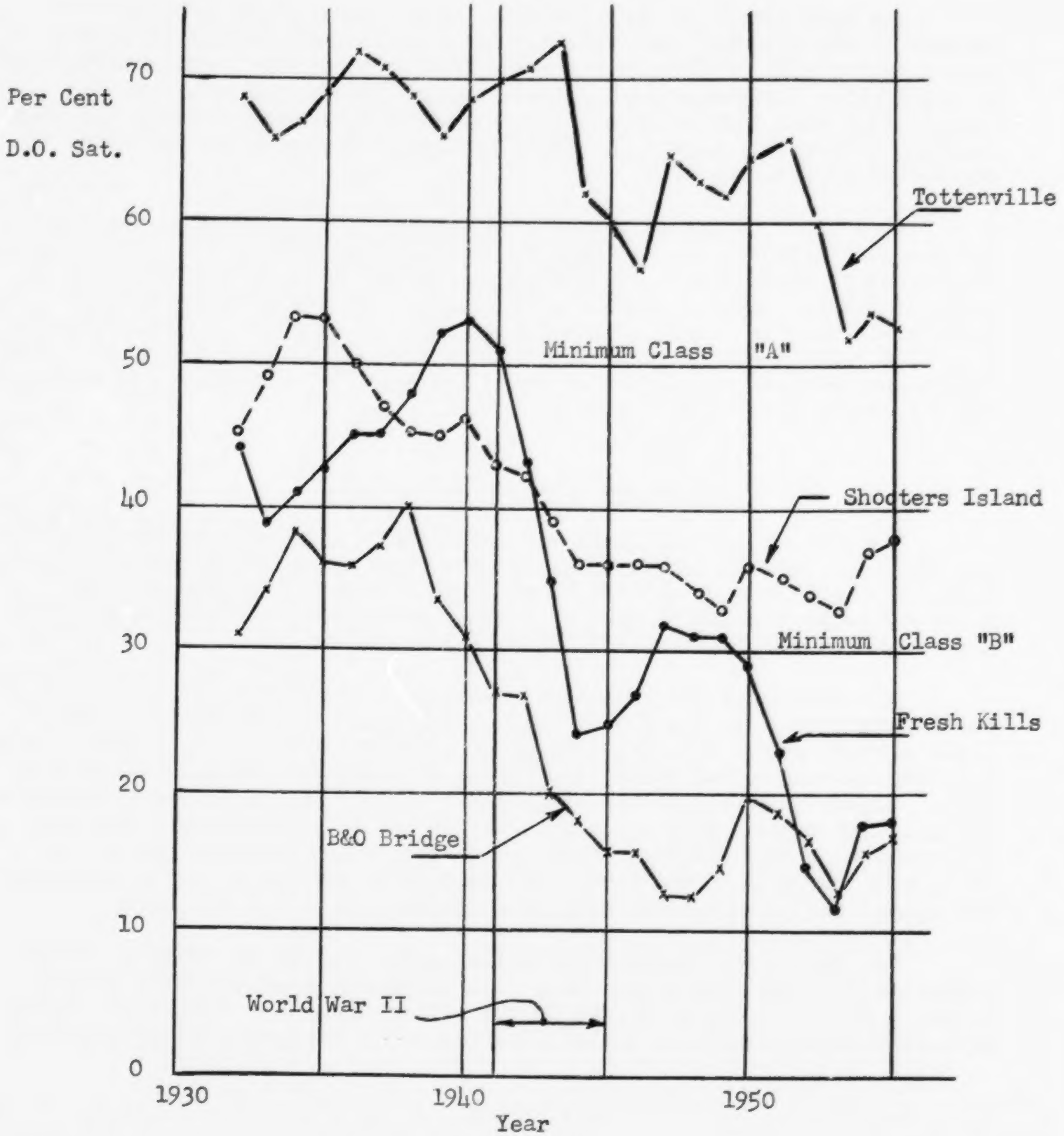
Individual survey records for dissolved oxygen are available since 1930. The average dissolved oxygen saturation for the respective sampling points is shown in Figure 1. A 3-year moving average was used in order to better illustrate trends and minimize the effect of variations in tidal and weather conditions.

This figure shows that the Arthur Kill at Tottenville is not as yet a serious sanitary problem. However, the trend in dissolved oxygen has been downward there since the early 1940's, and caution is indicated in regard to further increasing the pollutional load if it is desired to maintain an

Figure 1

PER CENT D.O. SATURATIONS AT SAMPLING POINTS
IN ARTHUR KILL, 1930-1955

3-Year Moving Averages



average oxygen saturation above 50 per cent. (Tottenville is in Class A waters.)

At Fresh Kills pollution conditions were not serious through the 1930's. However, in 1941 a sharp downward trend in the dissolved oxygen began which culminated in the waters of the Fresh Kills area becoming a nuisance. This trend coincided with the increased industrial activity during and after the war years.

The Arthur Kill at the B&O Bridge has been seriously polluted for decades by the discharge of large quantities of sewage in that immediate area. As a result of sharply increased industrial wastes loads superimposed on a gradually increasing sewage load, the waters of this area have so deteriorated as to now possess the unenviable distinction of being the most degraded of New York Harbor in regard to dissolved oxygen, as indicated in the Harbor Pollution Survey.

Sanitary conditions just outside the northern entrance to the Arthur Kill may be judged by the data for Shooters Island. These data show a downward trend of dissolved oxygen starting at about the same period as the other stations. However, the rate of decrease is significantly less at Shooters Island, the average dissolved oxygen not yet having been lowered to 30 per cent of saturation. This apparently results from the high rate of interchange between the waters of Upper New York Bay and Newark Bay through the relatively short Kill Van Kull.

Pollutional Load on Arthur Kill

The extreme conditions in the Arthur Kill, which became apparent during the war, are evidently the result of a large and growing pollutional load. The magnitude of this load may be evaluated in a number of ways. Since the major problem is that of abating a nuisance, the pertinent characteristic of the load is its biochemical oxygen demand.

The records of the Interstate Sanitation Commission were consulted for information as to the direct loads imposed on the Arthur Kill. These loads consist of raw domestic sewage, effluents from municipal sewage plants, and large quantities of industrial wastes discharged in or near the Arthur Kill. Of the total B.O.D. discharged, not all can be considered as directly applied load because some is carried out of the Kill immediately and does not reappear. Thus for Perth Amboy, situated at the southern end of the Kill, only one-half of the discharged load is considered to apply directly, the other half being carried away into Raritan Bay on the ebb tide.

The pollutional load on the Arthur Kill is shown in Table 2. This indicates that the industrial waste load comprises about one-half of the entire biochemical oxygen demand on the Arthur Kill. The Interstate Sanitation Commission Industrial Wastes Inventory also shows quantities of acids,

Table 2

POLLUTIONAL LOAD ON ARTHUR KILL

Source	Population (Thousands)	Flow M.G.D.	Total 5-Day B.O.D. Discharged Lbs/Day	Total 5-Day B.O.D. Applied Lbs/Day
Port Richmond	35	5	3,000	1,000
Industrial, East Shore (6 plants)	-	7	18,000	9,000
Elizabeth Joint Meeting	350	38	38,000	26,000
Elizabeth (untreated)	50	5	10,000	5,000
Linden-Roselle	53	13	8,000	8,000
Rahway Valley	60	9	4,000	4,000
Industrial, West Shore (23 plants)	-	218	44,000	44,000
Staten Island, sewered (est.)	10	-	2,000	2,000
Carteret	13	3	2,000	2,000
Woodbridge	21	3	3,000	3,000
Perth Amboy	41	7	9,000	4,000
			Total	108,000
Industrial				53,000
Municipal				55,000
East Side				12,000
West Side				96,000

oils, greases and toxic substances contributing to the degradation of these waters, the main sources arising from Union County, New Jersey.

The other single large source of pollution is the discharge of settled sewage from the Elizabeth-Joint Meeting plant. Inasmuch as the outfall is situated about one-and-one-quarter miles inside the northern entrance to the Arthur Kill, two-thirds of the load was estimated to apply directly to the Kill.

With the addition of the other smaller sources of pollution, a total applied load of some 108,000 lbs per day of 5-day 20°C B.O.D. is exerting its influence in the Arthur Kill, as compared to a total of 141,000 lbs per day discharged.

Another way of computing the B.O.D. load on the Arthur Kill is from the B.O.D. analyses made by the Harbor Survey. Such figures are available continuously from 1939. From these figures a profile of the average 5-day 20°C B.O.D. in the Kill may be drawn. This profile, in conjunction with the corresponding mean volumes of water, may be used to calculate the total biochemical oxygen demand present in the Kill, regardless of origin. Of this total B.O.D. present, some is brought into the Kill from the Raritan and Newark Bay ends by tidal circulation. The wastes directly discharged into the Kill superimpose their demand on this base level of pollution. If this base level is determined by obtaining the average B.O.D. of the waters entering the Kill, then the direct load can be evaluated.

A formula has been derived to show the relationship between total load present and the daily addition. Assuming perfect mixing and a uniform rate of addition and displacement, the following formula may be used:

$$\text{Daily Load} = \left[p + \frac{1}{D}\right]\left(\text{Total Load Present}\right)$$

where p = the proportion of the total carbonaceous B.O.D. present that is satisfied per day

and D = The theoretical detention period in days, so that $\frac{1}{D}$ represents the daily displacement.

Essentially, the formula states that, under equilibrium conditions, the total accumulated load present will be biochemically oxidized and displaced at individual rates whose sum equals the rate of daily application of load.

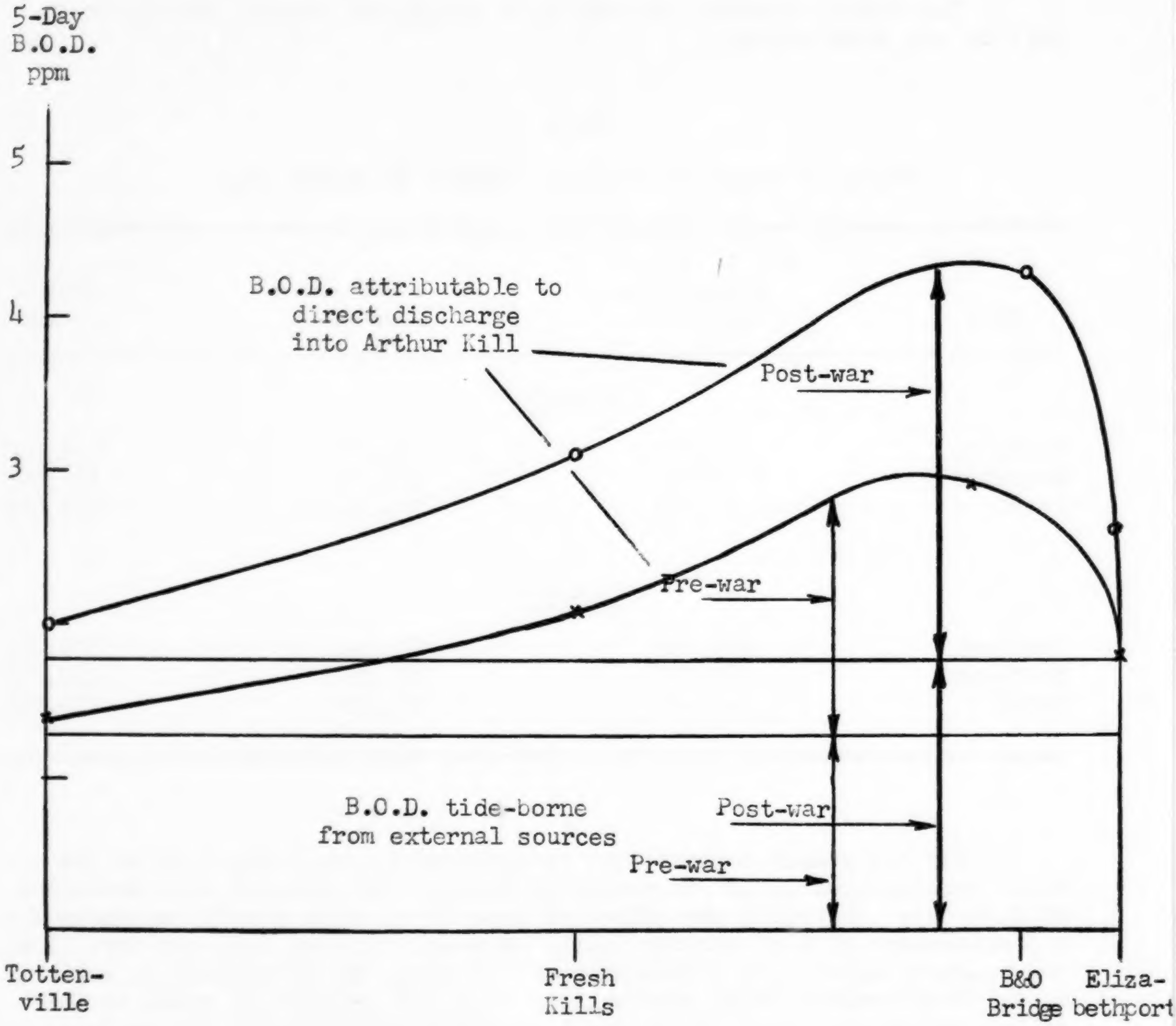
The B.O.D. of the waters of the Arthur Kill are shown in Figure 2 for two periods, namely, 1939-1941, depicting pre-war conditions, and 1945-1954, showing post-war conditions.

For the post-war period the average B.O.D. of waters entering the Kill was found to be about 1.75 ppm. B.O.D. values above this level therefore indicate direct shore line load additions, while 1.75 ppm was brought in from external sources. The corresponding pre-war datum was about 1.25 ppm.

For purposes of calculation, the northern and southern zones of the Kill were considered separately, inasmuch as different detention periods

Figure 2

SUMMER B.O.D. PRESENT IN ARTHUR KILL



and densities of loading are known to exist. The total 5-day 20°C B.O.D. present was computed, reach by reach, by finding the average concentration and the respective volume for each reach. The datum could then be subtracted from the total present to furnish the values of B.O.D. accumulated from direct shore line additions.

The totals obtained for each zone during the pre-war and post-war periods are shown below:

Table 3

POUNDS OF 5-DAY 20°C B.O.D. PRESENT IN ARTHUR KILL

Zone	Due to direct shore line addition	Due to external sources	Total present
	Pre-War		
Northern	81,000	82,000	163,000
Southern	40,000	112,000	152,000
Total	121,000	194,000	315,000
	Post-War		
Northern	125,000	114,000	239,000
Southern	63,000	157,000	220,000
Total	188,000	271,000	459,000

For the summer temperatures encountered in the Kill, 0.24 of the total carbonaceous B.O.D. is satisfied daily. The northern zone detention of 2.34 days (including the effect of some fresh water runoff) accounts for a displacement of 0.43 per day, giving a total ratio of 0.67 per day. For the southern zone, with a detention of 1.8 days, the corresponding ratio is 0.80. These ratios times the quantity of B.O.D. present is equal to the daily load application. Thus, the northern zone stores one-and-one-half times the daily load addition, while the southern zone holds one-and-one-quarter days load.

The direct shore line additions to provide the computed quantities of B.O.D. present above the datum levels are shown below:

Table 4

COMPUTED DAILY APPLIED LOAD (SHORE LINE), 5-DAY 20°C B.O.D.

Zone	Pre-War	Post-War	Per Cent Difference (of Post-War)
Northern	55,000	84,000	35
Southern	32,000	51,000	37
Total	87,000	135,000	36

Also included is the percentage difference between pre- and post-war loads based on the post-war value. As such, it is the proportion of present direct load to be removed to return to pre-war direct load.

The table finds an average applied shore line load of 135,000 lbs of 5-day 20°C B.O.D. per day for the period 1945-1954. The daily applied load, from Table 2, was found to be 108,000 lbs per day. The total applied loads, as derived in these different manners, are thus in reasonable agreement. However, the computed daily B.O.D. load (from Table 4) in the southern zone is higher than can be accounted for by shore line sources, as given in Table 2. This clearly indicates that a significant portion of the direct load on the northern zone finds its way southward by tidal interchange, thus appearing as a direct load on the southern zone.

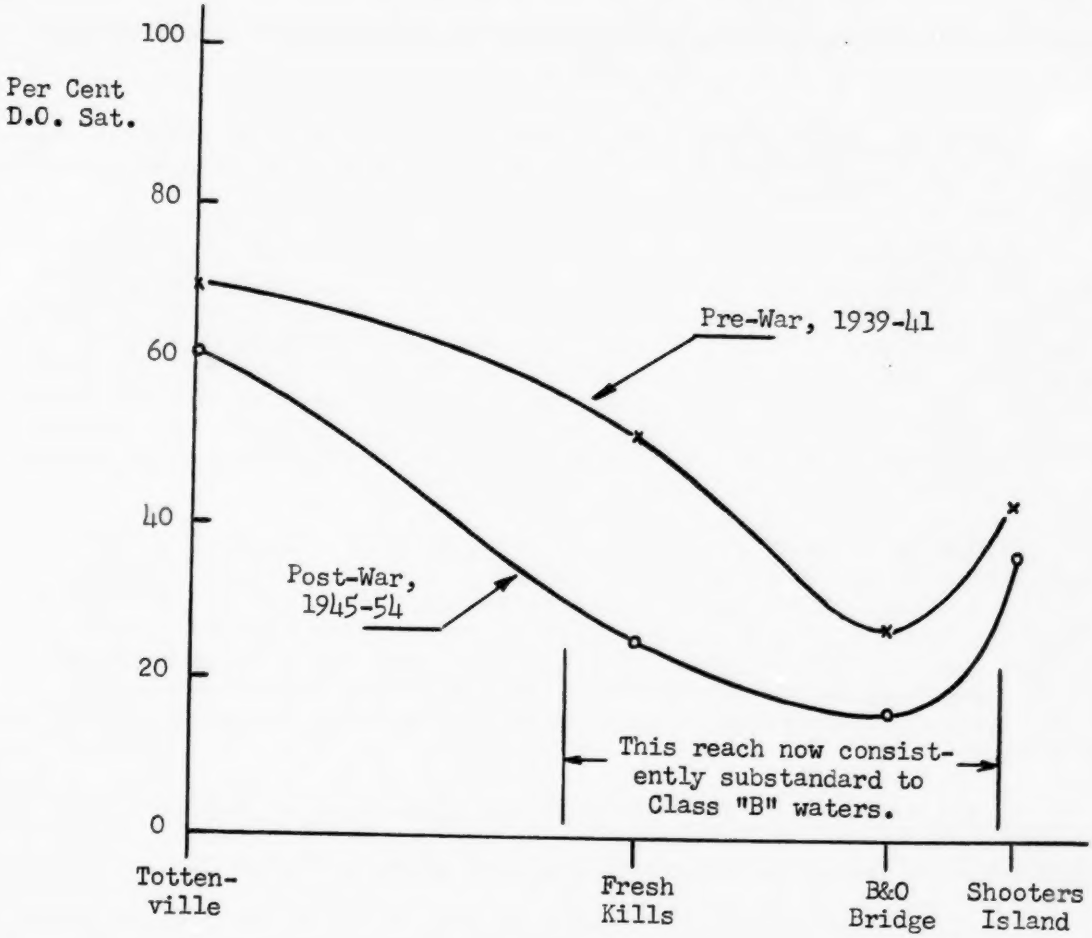
Returning to Table 3, it is apparent that a major portion of the B.O.D. burden on the Arthur Kill results from external sources, especially so in the southern zone. For the pre-war period this accounted for 62 per cent of the total B.O.D. present, while the corresponding figure for the post-war period was 59 per cent. Furthermore, there was a large increase in total load between the two periods. To restore the load from external sources to the pre-war magnitude, the post-war load must be reduced by 28 per cent.

In connection with the effects on the Arthur Kill of the loads previously discussed, it is interesting to examine the observed dissolved oxygen profiles for these periods. These are shown in Figure 3.

The Interstate Sanitation Commission requires that for Class B waters the dissolved oxygen should not be depressed below 30 per cent saturation during any week. For pre-war conditions this criterion was substantially met, except for the area in the vicinity of the B&O Bridge. On the other hand, as a result of the previously demonstrated increases in internal and

Figure 3

SUMMER SATURATION PROFILE ALONG ARTHUR KILL



external load, the oxygen was so depressed that, for the post-war period, over one-half of the length of the Arthur Kill averaged less than 30 per cent dissolved oxygen saturation for the entire summer. In order to restore the Arthur Kill to reasonable compliance with the standards of the Interstate Sanitation Commission, it appears necessary to at least reduce the load to that prevailing prior to the war. The previous computations have indicated that this would be accomplished by reducing the present direct shore line load by 36 per cent and the load from external sources by 28 per cent. If there is any future increase of load, a greater proportion of that total future load would have to be removed to restore pre-war conditions.

It might be pointed out that the effect of application of a given load on the dissolved oxygen in the Kill will vary according to location. Such relationships have been plotted on Figure 4 for Fresh Kills, B&O Bridge and Shooters Island. It can be seen that a given B.O.D. concentration at Shooters Island depresses the dissolved oxygen less than the same B.O.D. at B&O Bridge. This is to be expected inasmuch as the waters at Shooters Island freely interchange with those in Kill Van Kull and Newark Bay. The large volumes of water interchanging with Shooters Island waters reduces the response to load.

Fresh Kills, when lightly loaded, had acceptable dissolved oxygen conditions because of some contact with the relatively clean waters to the south. As load on Fresh Kills increased, a sharp reduction in dissolved oxygen occurred. This sensitivity to load application reaffirms that pollution in this area is not readily removed by tidal currents. Caution should be exercised when considering safe loading conditions in the vicinity of Fresh Kills.

Figure 4

RELATION OF PER CENT SATURATION D.O. TO 5-DAY B.O.D., BASED ON GROUPED AVERAGES OF 1939-1954 DATA